FERNS

BULLETIN 987-2

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Brenda Beckham, and Sharlys Crisafulli

"A thing is right if it tends to preserve the beauty, integrity and stability of the biotic community; it is wrong when it tends otherwise."

Aldo Leopold
"The Land Ethic," *A Sand County Almanac*

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Contents

Natural History of Ferns

Ferns first appeared in the fossil record more than 350 million years ago. At that time, what is now temperate Europe and North America had climate conditions that favored year-round growth; the land was low and covered by swamps and shallow seas. For millions of years, the earth was dominated by cycads, ginkgos, conifers and seedless vascular plants, including ferns, lycophytes (lycopodias and selaginellas), and bryophytes (mosses and liverworts). These plants laid down the deep coal beds we now mine for energy.

Most of the dominant tropical coal-swamp plants became extinct over time. Only the ferns and herbaceous relatives of the lycophytes -- clubmosses, selaginellas and horsetails -- continued to flourish and evolve. Today, many of these plants appear untouched by evolution and look much like they did millions of years ago. Ferns also inhabit all of the continents except frozen Antarctica.

Having been on earth prior to the Carboniferous Period (280 to 345 million years ago), ferns have survived and evolved through a long, turbulent history of time and space; a time when continental land masses were splitting and colliding, oceans were expanding and shrinking, and phenomenal climate changes were occurring.

Ferns did not arise as a single monolithic family, but as several families or groups. The royal ferns (*Osmundaceae*) and the filmy ferns (*Hymenophyllaceae*) existed 210 million years ago, according to fossil records. Interrupted fern (*Osmunda claytoniana*), which currently grows only in eastern North America, is known to have existed 206 million years ago. Other families, including the spleenworts (*Aspleniaceae*), chain ferns (*Blechnaceae*), wood ferns (*Dryopteridaceae*) and polypodies (*Polypodiaceae*) are much younger, with fossilized records dating to the Cretaceous Period, about 75 million years ago. Sensitive fern (*Onoclea sensibilis*), found in eastern North America and eastern Asia, existed during the early Tertiary Period, about 55 million years ago. Many other fern families are no more than 2 to 3 million years old, and a few species, like log fern (*Dryopteris celsa*), are of recent origin – only 18,000 years old (see Figure 1).

Some closely related fern species are widely distributed around the earth, yet great distances separate them. One explanation for this is the continental drift that occurred at least once during the past 150 million years. As land masses separated and collided, fern species colonized new areas. A second explanation for this widespread distribution is long-distance spore dispersal. Ferns produce millions of spores that, when ripe, are ejected or catapulted into the surrounding air. Their dust-like particle size can be easily picked up by the wind and transported enormous distances in the earth's upper atmosphere and jet stream. Experiments have shown that fern spores can tolerate the cold temperatures and intense ultraviolet radiation present in the upper earth's atmosphere.

There are about 12,000 species of ferns in the world today. Most are found in the tropics. Currently, Georgia is home to 36 genera, 119 species and 12 hybrid ferns. The list is constantly expanding as new plants are found.

Fern Allies

Lycophytes, horsetails and whisk ferns are often referred to as "fern allies," because they generally don't resemble ferns, but do have some similarities. Lycophytes, which include Quillworts (*Isoetes*), Spikemosses (*Selaginella*) and Clubmosses (*Lycopodium*), are less closely related to ferns and are more closely related to an ancestral plant that is not shared by the ferns. Ferns and seed plants are more closely related to each other than either is to the lycophytes (see Figure 1).

On the other hand, fossil records and DNA analysis have revealed that horsetails (*Equisetum*) and whisk ferns (*Psilotum* and *Tmesipteris*) ARE ferns, even though they don't resemble ferns. Whisk ferns consist of leafless branches and slender, creeping rhizomes, but no roots. They are one of the simplest and most unique vascular plants on earth.

Ten species of clubmosses, seven species of spikemosses, two species of horsetails and one species of whiskfern are native to Georgia. However, they are difficult to grow and are not good candidates for culture by the average gardener. Therefore, they are not described in this publication.

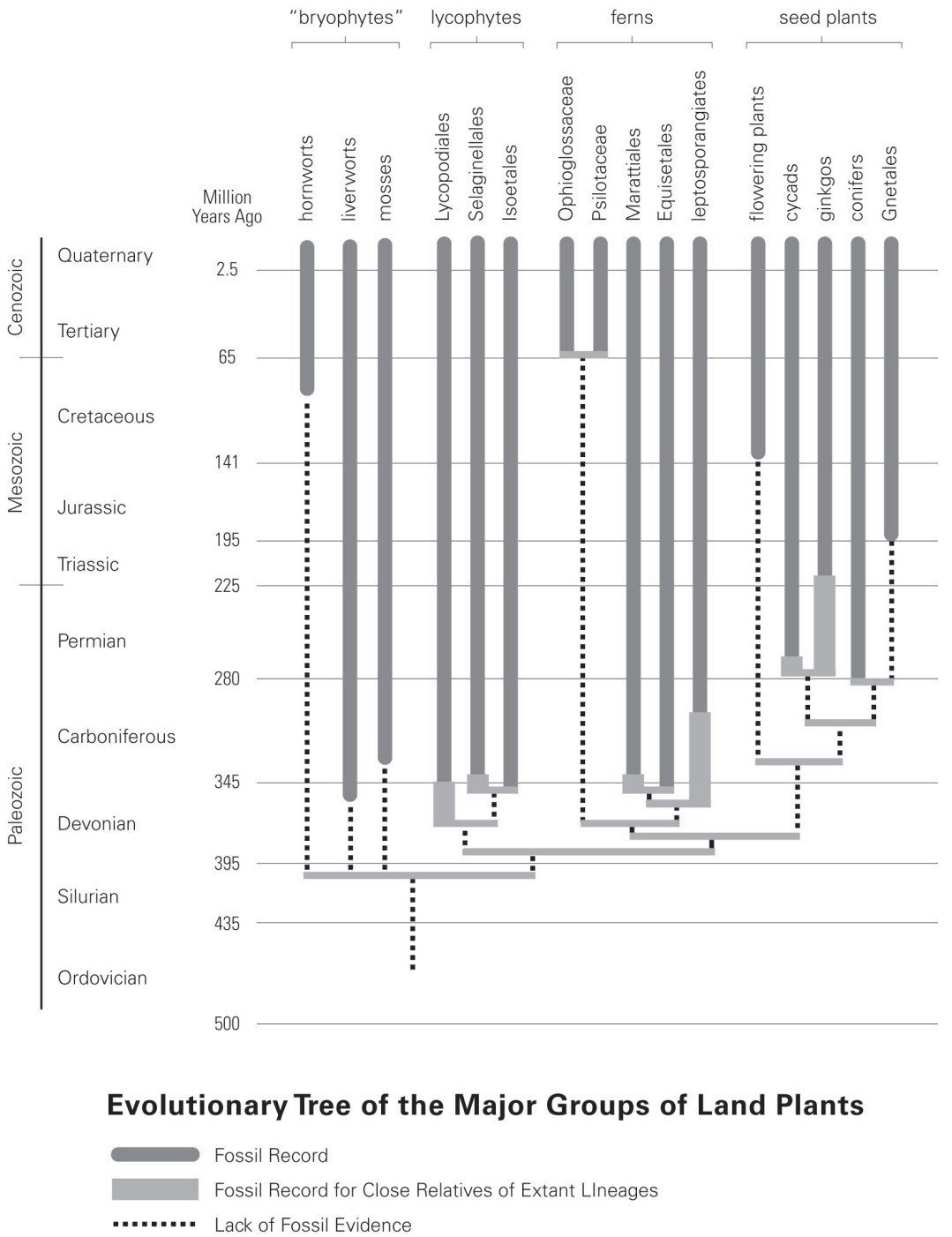


Figure 1. From R. Moran, 2004. *A Natural History of Ferns*.
(Redrawn by Angela Rowell, UGA, CAES Office of Communications)

Fern Life Cycle

The fern life cycle involves two distinctly different stages: the **sporophyte stage** and the **gametophyte stage** (see Figure 2). The sporophyte stage begins with a **zygote**. In the sporophyte stage, the young sporophyte has roots, stems and leaves like other vascular plants. The spore-bearing fertile fronds are called **sporophylls**. On their underside are borne clusters of sporangia, called **sori**. The cells within the walls of the sporangia become **spore mother cells**. These cells undergo a genetic process called **reduction division** with each spore mother cell splitting into four meiospores. When mature, the sporangia burst open and the spores are shot into the air. A single fern can release millions of dust-like spores that may be carried some distance by air currents before landing. If the environment where a spore lands is favorable, a spore will germinate and grow into a small heart-shaped gametophyte plant that is usually less than ¼-inch across. The leaf-like game-

tophyte contains chlorophyll and makes its own food. On the underside of the gametophyte, hair-like growths aid in absorption. Near the point in the heart-shaped gametophyte are borne **antheridia** (male parts), and near the notch in the gametophyte are clusters of **archegonia** (female parts). Fertilization occurs when a sperm from an antheridium unites with an egg from an archigonium to form a zygote. The zygote germinates and grows into a young fern plant, and the life cycle starts again.

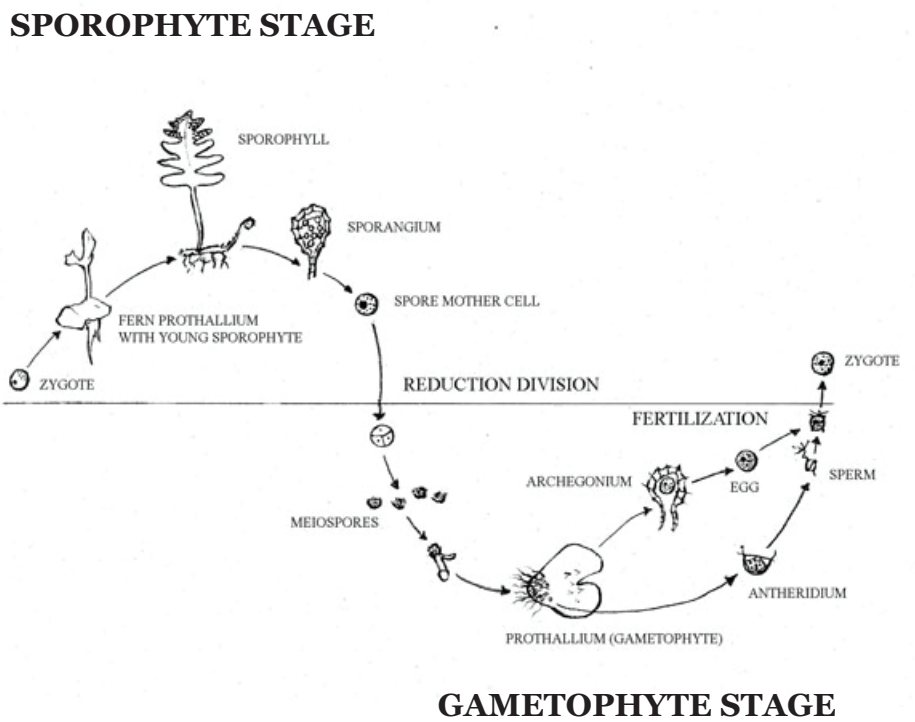


Figure 2. Fern life cycle
(Redrawn by Jonathan Bowman, from Greulach, *Botany Made Simple*)

Identifying Ferns

Unlike many other vascular plants, ferns do not have aerial stems. The leaves arise from an underground stem, called a **rhizome**. The entire fern leaf is called a frond. The frond consists of the **stipe** and the **blade**. The continuation of the stipe to which the leaves are attached is called the **rachis**. A leaflet is called a **pinna** (plural, **pinnae**). A division of a pinna is called a **pinnule**. See Figure 3 and the glossary for more detailed descriptions.

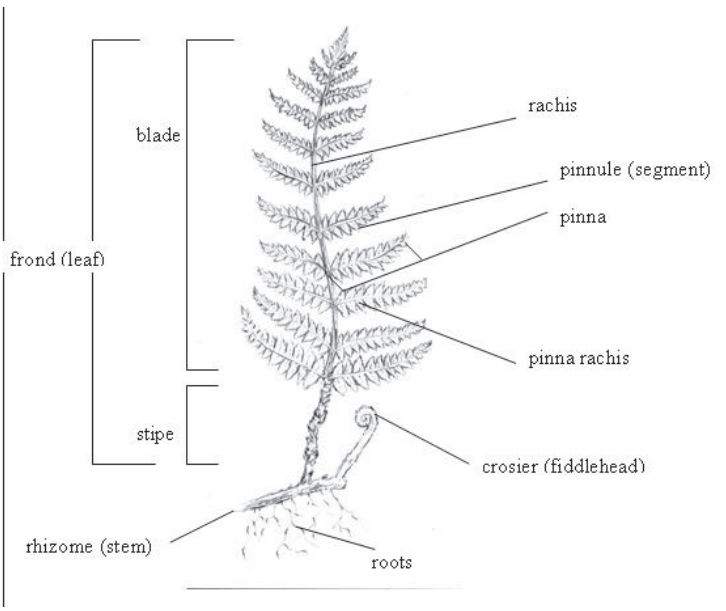


Figure 3. Parts of a fern
(Redrawn by Jonathan Bowman, from Mickel, *Ferns for American Gardens*)

One characteristic used to identify ferns is the structure of the frond, and the level to which a frond is divided (See Figure 4). Frond structure ranges from simple (the blade is undivided) to compound (the blade is divided into smaller parts). A common blade structure, called **pinnate**, produces **pinnae** (singular **pinna**) that are attached to an elongated rachis. Each pinna may be again divided to become **bipinnate** or **tripinnate**. Leaf blades that are deeply lobed but not fully divided into individual segments are said to be **pinnatifid**. When the first level of blade arrangement is pinnate and the second pinnatifid, the leaf is called **pinnate-pinnatifid**. When both levels of blade arrangement are pinnatifid, the frond structure is called **bipinnatifid**.

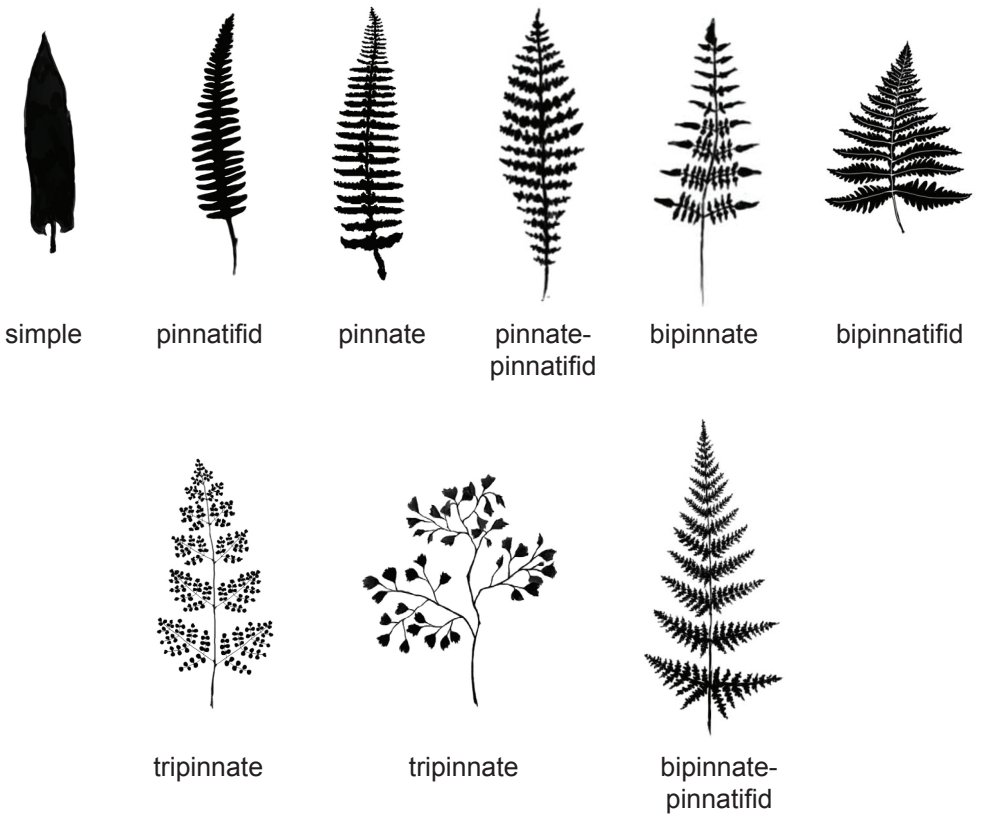


Figure 4. Fern frond structures
(Redrawn by Jonathan Bowman, from Mickel, *Ferns for American Gardens*)

In some ferns, the sterile and fertile fronds may appear distinctly different. Others have fronds that are **dimorphic**, which means they have two different leaf forms on the same frond (Figure 5). These are other characteristics used to describe and identify ferns.

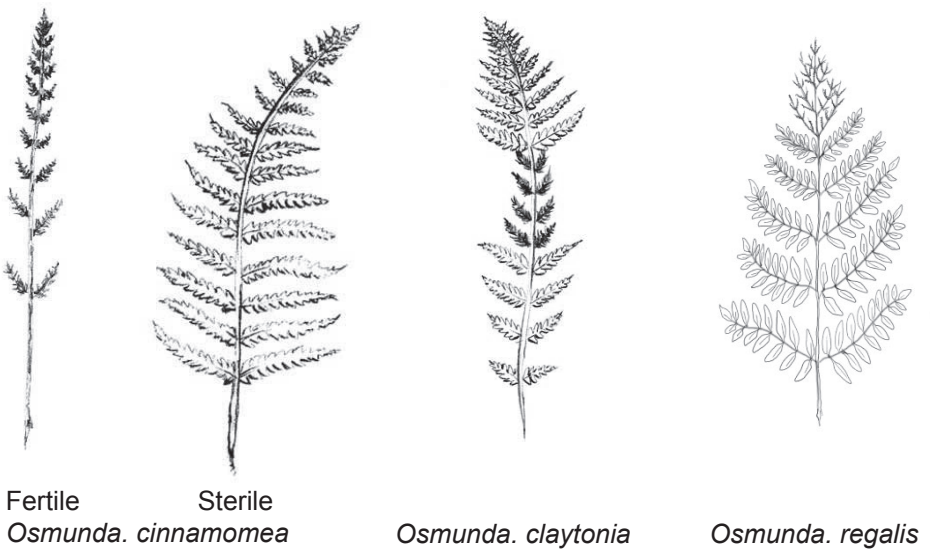


Figure 5. Examples of dimorphic fern fronds
(Redrawn by Jonathan Bowman, from Mickel, *Ferns for American Gardens*)

Ferns are further described according to the habit of their rhizome (Figure 6). Some ferns have a **long-creeping rhizome**, others a **short-creeping rhizome**, and still others an **ascending rhizome**.

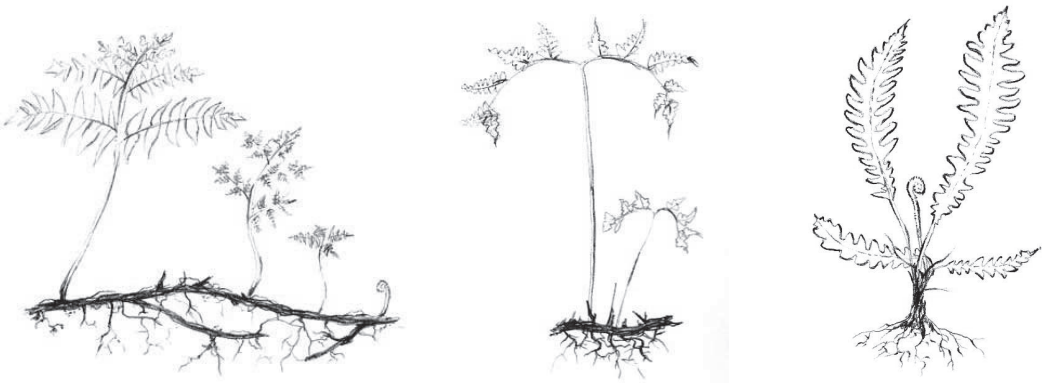


Figure 6. Rhizome habits
(Redrawn by Jonathan Bowman, from Mickel, *Ferns for American Gardens*)

Fertile fronds contain spore-bearing sporangia arranged in clusters called **sori** (singular **sorus**). In many ferns, each sorus is covered by a thin membrane called an **indusium** (plural **indusia**). In others, an indusium is not present. There are some fern species in which the sori are not covered by a true indusium but have their sori located beneath in-rolled margins of the fronds. This is called a **false indusium**. The presence or absence of indusia and the structure of the indusia are further characteristics used to identify and describe ferns.

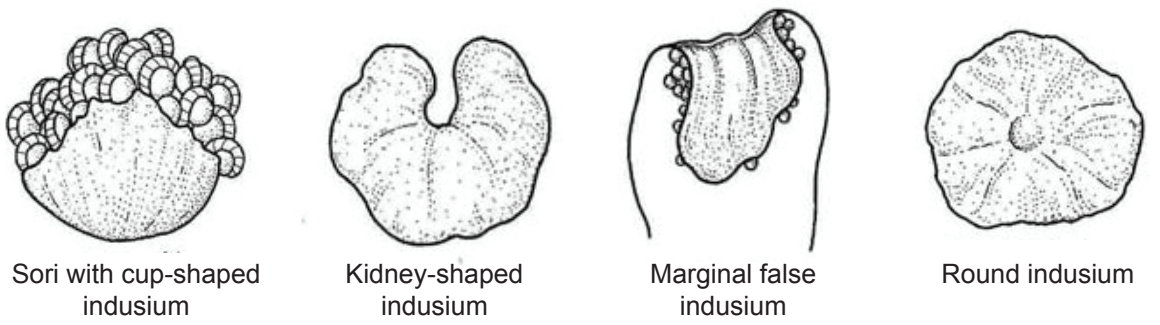


Figure 7. Examples of indusia
(Drawings by Anna Stone from *Hawaii's Ferns and Fern Allies*, Daniel D. Palmer, 2003)

Gardening with Ferns in Georgia

To grow ferns successfully, it is important to match the site characteristics and growing environment with the native requirements of the fern species you intend to grow. Even if a fern is native to Georgia, it may not be native to the area of the state where you live. In order to successfully grow ferns outside their native habitat, you must try to simulate the soil conditions and climate in which they are found in nature. The vast majority of native ferns need soils high in organic matter with moderate moisture retention. Except for rugged areas in the mountains and perennial wetlands, most land in Georgia has been farmed, making the soils and growing environment less suitable for ferns.

Native ferns offer a wide diversity of sizes, growth habits, forms and niches for gardens. They provide a unifying element to the woodland garden, weaving their green fronds over the forest floor. In late summer, their rich green fronds add life to the forest as other plants fade and drop their leaves. A woodland garden looks incomplete without ferns.

Most ferns have three basic growing requirements: **shade**, **moisture**, and loose, well-drained **soil** high in organic matter.

Shade
Nearly all ferns prefer filtered shade -- the type cast by tall trees with pruned limbs. Filtered shade can also be obtained by planting on the northeast side of a building where shade is cast by the building most of the day or in courtyards shaded by surrounding buildings. North-facing slopes, as well as walls and fences with north/south orientations that cast shade during the afternoon also offer filtered shade. Protection from the hot afternoon sun and drying winds is essential. Ferns generally do not like dense shade created by thick forest canopies where little light reaches the forest floor. In the wild, ferns thrive in an open forest or near the edges of forests where light penetrates, but is filtered by foliage.

Moisture
In the wild, ferns are found in a variety of habitats, most of which are moist. Adding organic matter to the planting area, planting in depressions where moisture drains, or providing drip irrigation are ways to make the growing environment more suitable for ferns. A natural way to trap moisture in an area is to allow large woody debris, like logs or large limbs, to rot in place when they fall. As they decompose, they act as natural water reservoirs, trapping rain and holding onto it like a sponge.

Newly planted ferns need to be watered thoroughly and repeatedly during establishment to maintain an adequate moisture level. The root system may take up to two years to get fully established, so supplemental moisture may be needed during periods of limited rainfall. Tree roots compete with ferns for water and nutrients, so when ferns are planted under trees, supplemental irrigation will be necessary.

Soil
Ferns need well-drained soil enriched with organic matter like compost. Heavy clay soils, or soils with little organic matter, do not have adequate pore space for sufficient root growth. Clay soil is not suitable unless it is amended with compost, rotted wood chips, and/or some type of aggregate to improve its structure and texture.

Ferns have a wide preference for soil pH (a measure of the soil acidity or alkalinity level). Soil pH can be determined by a soil test -- available for a nominal fee through your local county Extension office (http://aesl.ces.uga.edu/soil/Georgia.htm). Some species are restricted to acid soil (pH 4.7 - 5.5), some prefer a more neutral pH (pH 6.6 - 7.2), while others grow over a wide range (pH 4.7 - 7.2). A few ferns that require an alkaline pH (above 7.0) and need calcium grow on limestone rocks or in soils amended with lime. Some ferns must grow on rocks or boulders that provide a cool, moist surface and crevices for their rhizomes (creeping underground roots).

Ferns to Avoid
Japanese climbing fern (*Lygodium japonicum*), old world climbing fern (*Lygodium macrophyllum*) and Marianna maiden fern (*Macrothelypteris torressiana*) are non-native ferns that have escaped cultivation and become invasive. Avoid planting these ferns. In this publication, Carolina mosquitofern (*Azolla caroliniana*) and bracken fern (*Pteridium aquilinum*) are described because they are native ferns; however, Carolina mosquitofern is invasive in aquatic environments and bracken fern is poisonous, so neither fern is recommended for culture.

Guide to Plant Descriptions

The native ferns described in this publication may not all be worthy of landscape culture, but most are. Some are described for the historical role they played in agriculture. Others with known invasive or other undesirable qualities are described for information purposes only. Still others may be difficult to cultivate without precise simulation of their native growing environment, but they are of botanical interest. Some ferns may be difficult to find in the nursery trade, but descriptions of their qualities may prompt a few astute growers to begin growing them and offering them for sale. Rare or endangered species of ferns are not described, and collecting them from the wild, except during organized plant rescues, is discouraged.

Ferns in this publication are grouped according to family and alphabetized, by scientific name, within the family. The description of each fern follows this format:

Common name(s) / Botanical name: Generally accepted scientific and common names used by specialists in the field. The ancient ancestry and evolution of ferns has resulted in a great deal of disagreement among botanists as to the family and genus to which many ferns belong. In this publication, *Flora of the Carolinas, Virginia, Georgia, northern Florida, and Surrounding Areas* by Alan S. Weakley was used as the authority on fern classification. http://www.herbarium.unc.edu/WeakleyFlora_2008-Apr.pdf

Characteristics: This category provides identifying characteristics, including information about the frond shape, the size, shape and arrangement of the pinnae, stipe shape and length, as well as the size and shape of the sori and indusia. To become familiar with these terms, review figures 3 through 7 and the glossary at the end of this publication.

Landscape uses: Suggestions are made for using the plant effectively in the landscape. To grow native ferns successfully, it is important to simulate their native growing environment and to follow appropriate cultural management practices to provide their growing requirements.

Size: This is an indication of mature plant size, not the size of an individual frond. Some ferns grow in colonies with spreading rhizomes, so plant size will vary with plant age and is influenced by the growing environment.

Zones: This refers to the U.S. cold-hardiness zones to which the fern is adapted or found growing in its native habitat. The average winter temperature of the region in which they are to be grown influences which ferns can be grown successfully in your area. Figure 8 shows the Cold-Hardiness Zones for Georgia taken from the 1990 USDA Cold-Hardiness Zone Map.

Habitat: A description of the type of growing environment where the fern is found in the wild.

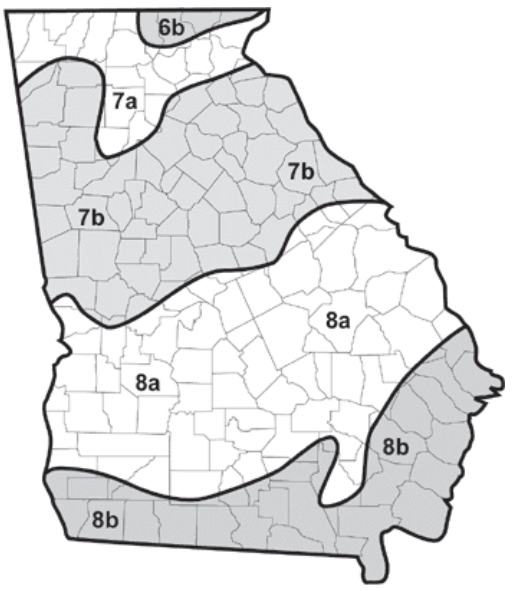
Native to: The broad geographic area where the plant naturally occurs. Georgia has three geographical regions: Mountains, Piedmont and Coastal Plain. Plant distribution is sometimes described in terms of these geographical regions.

Comments: Additional noteworthy information about the plant.

Images: Page showing images of the plant.

Average annual minimum temperature ranges	
Zone	**Range in degrees Fahrenheit**
6b	-5 to 0
7a	0 to 5
7b	5 to 10
8a	10 to 15
8b	15 to 20

Figure 8. Cold-Hardiness Zones in Georgia



The Spleenwort Family - *Aspleniaceae*

The Spleenworts are a large genus of small, culturally challenging, promiscuous ferns, mostly suited for moist, shaded rock gardens. While most are tropical epiphytes in this hemisphere, the temperate species grow mostly in sandstone, limestone or granite rock crevices.

Fifteen Spleenwort species and several hybrids are native to Georgia. Most are either rare or endangered. Four of the most common species in Georgia are described below.

Mountain Spleenwort / *Asplenium montanum*

Characteristics: Fronds are numerous, drooping, delicate, bluish-green and evergreen. There are four to seven pairs of pinnae on short stalks. They are pinnate at the base of the rachis, and pinnatifid at the top of the rachis. The rachis is broad, green, flat and winged at the apex. The rhizome is short-creeping, dark and wiry, often obscured by old stipe bases. The stipe is ¾-inch to 2 inches long, brown below and green above.

Landscape uses: Mountain Spleenwort is always associated with rocks, growing next to or tucked tightly into non-calcareous rock crevices. Use this small, delicate plant in a shaded rock garden.

Size: 3 to 5 inches high

Zones: 4 to 7

Habitat: Acidic soils in shaded, non-calcareous rock crevices.

Native to: North Georgia Mountains, northward into Ohio and Massachusetts.

Comments: Slugs can be a problem. Mountain Spleenwort is somewhat difficult to cultivate due to its requirement for a rocky environment.

Images: Page 16

Ebony Spleenwort / *Asplenium platyneuron*

Characteristics: Slender, pinnate fronds are either fertile or sterile. Fertile fronds arise from the center of the plant. They are erect and remain green late into the season. The arching, evergreen sterile fronds are shorter than the fertile fronds, and are spreading, flat and have light-green pinnae. The stipe and rachis are deep reddish brown to black. The rootstock is short-creeping.

Landscape uses: Ebony Spleenwort is the most adaptable and easy to cultivate of this genus, growing equally well on red clay banks, disturbed or open woodlands, dry forests or in rock crevices. It is adaptable to either acidic or calcareous soils, provided they are well-drained.

Size: 10 to 18 inches high and slowly spreading to a 6-inch clump

Zones: 4 to 8

Habitat: Disturbed or open woodlands and rock crevices.

Native to: All of Georgia, except the southeastern Coastal Plain. It ranges from Maine to Michigan, south to Texas and Florida.

Comments: One of the most widely available spleenworts in the trade. It is sensitive to overwatering. Slugs can be a problem.

Images: Page 16

Black-stemmed Spleenwort / *Asplenium resiliens*

Characteristics: Fronds are slender, leathery and dark green, with a short stipe. Pinnae are opposite, oblong in shape with blunt tips and smooth margins. The stipe and rachis are black and shiny.

Landscape uses: Use this fern in a shady, moist, calcium-rich environment. Tuck it into pockets between limestone slabs or rocks.

Size: 6 to 12 inches high and 6 inches wide

Zones: 6 to 9

Habitat: Crevices in shaded calcareous rocks.

Native to: Subtropical America, northward to Arizona, east to Missouri and southern Pennsylvania. Found in limestone valleys of northwestern Georgia and also in the Coastal Plain.

Comments: Black-stemmed Spleenwort resembles Maidenhair Spleenwort (*A. trichomanes*) in appearance, but is slightly larger. Slugs can be a problem.

Images: Page 17

Maidenhair Spleenwort / *Asplenium trichomanes*

Characteristics: Narrow, arching, evergreen fronds are in scale with the size of the plant, and the combination of medium green pinnae with a dark red rachis create a delicate contrast. Pinnae are small (1/4-inch long), rounded to oblong in shape, and have wavy margins.

Landscape uses: This small fern is a great addition to a moist, shaded rock garden. Plant it in rock crevices.

Size: 3 to 5 inches high and 3 to 6 inches wide

Zones: 2 to 8

Habitat: Shaded, damp rock crevices.

Native to: Newfoundland to Ontario, south to Oklahoma, Louisiana, Tennessee and the Piedmont and mountain areas of Georgia.

Comments: Somewhat difficult to cultivate since it prefers rock crevices.

Images: Page 17

The Mosquito Fern Family - *Azollaceae*

Carolina Mosquitofern / *Azolla caroliniana*

Carolina Mosquitofern has had an enormous economic impact on agriculture due to its relationship to rice culture. A blue-green alga, capable of fixing nitrogen, grows between its leaves. The rice industry has depended on this fern for the algae that provide nutrients that allow rice to grow. However, Mosquitofern has invasive potential in aquatic environments and is not recommended for culture. It is included in this publication because it is native, and because it has played an historical role in American agriculture.

Images: Page 17

The Chain Fern Family - *Blechnaceae*

Genus *Woodwardia* – Chain Ferns

The common name "chain fern" refers to the characteristic elongated sori arranged like links in a broken chain along the pinnule or segment midveins (see line drawing on page 18). Two species occur in Georgia: Netted Chain Fern and Virginia Chain Fern, both of which appreciate a moist, shaded habitat.

Netted Chain Fern / *Woodwardia areolata*

Characteristics: This fern has both sterile and fertile fronds. The sterile fronds have wide pinnae that are fused at the winged rachis. The pinnae alternate along the rachis. The veins within the pinnae are conspicuously netted (see line drawing p. 18). Fertile fronds are taller and emerge in late summer. Their pinnae are linear, alternate and widely spaced. The sori fill the underside of the pinnae and are arranged in long chains. The rhizome is long-creeping and branching.

Landscape uses: Netted Chain Fern forms new growth constantly from its rhizome. It pops up quickly in the spring. It is a good choice for a moist, partially shaded garden. It spreads slowly and is easy to keep within bounds.

Size: 12 to 28 inches high and 2 to 3 feet wide

Zones: 5 to 9

Habitat: Wet to moderately dry soils. Also found in acidic soils of swampy woods, along streams, or near wet, shaded rocks.

Native to: Southeastern North America, especially coastal areas. It is one of the most widespread ferns in Georgia, with good distribution throughout the state.

Comments: Netted Chain Fern can be confused with the more aggressive Sensitive Fern (*Onoclea sensibilis*). Sensitive Fern has wavy blade margins, while Netted Chain Fern has tiny teeth along its margins. Also, Sensitive Fern frond segments are opposite along the rachis while those of Netted Chain Fern tend to be alternate.

Images: Page 18

Virginia Chain Fern / *Woodwardia virginica*

Characteristics: Fronds are 18 to 48 inches long. They emerge in rows from a long-creeping rhizome. Fronds are coarse, lustrous, leathery and deciduous. Fertile fronds appear in summer and have a shiny dark brown stipe. The blade is pinnate-pinnatifid, widest at the base with alternate pinnae. The sori are chainlike, linear and arranged parallel to the frond's mid-vein.

Landscape uses: In deep shade, this fern has a rambling nature, with arching fronds in rows about 1 foot apart. In a sunny location, the fronds become more clustered, erect and stiff. It orients its foliage toward the prevailing light. Plant it in wet areas.

Size: 2 to 3 feet long and 3 to 4 feet wide

Zones: 4 to 9

Habitat: Moist to wet, acidic, organic soils like bogs, blackwater bottomlands, pocosins and flooded coastal depression ponds.

Native to: Nova Scotia west to Michigan and Illinois, south to Texas and Florida. In Georgia, it is common in the Coastal Plain and occurs sporadically above the fall line.

Comments: Moderately easy to cultivate under the right conditions.

Images: Page 18

The Bracken Family – *Dennstaedtiaceae*

Eastern Hay-scented Fern / *Dennstaedtia punctilobula*

Characteristics: Airy fronds are bipinnate to bipinnate-pinnatifid, oval-oblong in outline, yellow-green in color and thin-textured. The stipe is 4 to 12 inches long, shiny and reddish-brown to brown. The sori are cylindrical in shape and borne in distinctive cup-like indusia at the leaf margins. Dense rhizomes spread rapidly and out-compete other plants where there is some disturbance.

Landscape uses: Hay-scented fern is aggressive, so use it with caution. It does not make a good companion planting for other herbaceous plants, because it out-competes them for space. It tends to spread too rapidly for use in smaller gardens, but it is attractive and requires little care in large gardens where there is plenty of room. Use it adjacent to large rocks where it softens their harsh lines and fills in vacant spaces.

Size: 15 to 24 inches long and 3 to 4 feet wide

Zones: 3 to 8

Habitat: Uplands and hillsides in moderate shade and along edges of woods and streams.

Native to: Eastern North America, southward to Arkansas and northern Georgia. It is common in the northern Georgia mountains, and is found as far south as Fulton and DeKalb counties.

Comments: The common name refers to the smell of new-mown hay released when the fronds are crushed or bruised. Deer avoid Hay-scented Fern, probably because of its odor.

Images: Page 19

Bracken Fern / *Pteridium aquilinum*

Bracken Fern is included here because it is one of the most widespread ferns in North America. In the U.S., only Nebraska lacks populations of Bracken Fern. It also grows throughout tropical America, Eurasia, Australia and parts of Africa. However, it is invasive and poisonous to humans and livestock, so it is not recommended for culture.

Images: Page 19

The Wood Fern Family - *Dryopteridaceae*

Genus *Dryopteris* – Wood Ferns

Wood Fern species are numerous in Georgia. Wherever two or more Dryopteris species are growing together, there is a good chance hybrids will be present; therefore, there is a great deal of taxonomic confusion within this genus. Eight species are found in Virginia, North and South Carolina, and Georgia

The Wood Fern family includes many garden-worthy ferns. They are strong clumpers and moderately slow growers, sending up one flush of new fronds each year. They have few problems in a garden when provided with moist, rich, well-drained woodland soil.

Log Fern / *Dryopteris celsa*

Characteristics: Fronds are 3 to 4 feet long with an oblong blade, slightly narrowed at the base and gradually tapering at the tip. Sori are round, located near the midveins and have kidney-shaped indusia.

Landscape uses: Log Fern is a vigorous and easy fern to grow. It needs consistent moisture, especially when grown in sunny areas. Woody debris or a rotted log make good planting substrates.

Size: 2 to 4 feet high and 2 to 3 feet wide

Zones: 5 to 9

Habitat: Wet slopes, hammocks and swamps with calcareous soils.

Native to: New Jersey, Pennsylvania to Kentucky, Missouri, south to Louisiana, Alabama, South Carolina and northwestern Georgia.

Comments: This fern is a hybrid resulting from a cross between Goldie's Wood Fern (*D. goldiana*) and Southern Wood Fern (*D. ludoviviana).*

Images: Page 19

Crested Wood Fern / *Dryopteris cristata*

Characteristics: Fronds are narrowly oblong and pinnate-pinnatifid, 15 to 30 inches long. The pinnae are narrowly triangular, broadest near the rachis. Erect fertile fronds have pinnae turned at right angles to the plane of the frond, like an open venetian blind. The shorter, sterile fronds are evergreen, bluish-green and arching. The rootstock and stipe are clothed in light brown scales.

Landscape uses: Plant Crested Wood Fern in moist soil, rich in organic matter. Planting it on a moist bottomland site adjacent to a stream or pond is ideal. It needs plenty of moisture, particularly when grown in sun.

Size: 16 to 30 inches high and 6 to 12 inches wide

Zones: 3 to 7

Habitat: Marshes, bogs and swamps. It prefers acidic soils.

Native to: Northeastern North America, Alabama, Tennessee, North Carolina and one Georgia county (Fulton).

Comments: Georgia is at the southern limit of its growing range. Crested Wood Fern is rare in Georgia, but it is included here because it is worthy of landscape culture.

Images: Page 20

Goldie's Wood Fern, Giant Wood Fern / *Dryopteris goldiana*

Characteristics: A large, imposing specimen with broad, bipinnate, lustrous, golden-green fronds supported by stout stipes that are thickly covered in rusty brown hair-like scales. The fronds are 12 to 48 inches long. Pinnae are alternate, with fine marginal teeth. Sori are in two rows, close to the midvein.

Landscape uses: Goldie's Wood Fern is a slow growing, clumping fern for woodland plantings. It looks good rising above groundcovers, such as goldenseal or wildflowers.

Size: 3 to 4 feet high and 28 to 38 inches wide

Zones: 3 to 7

Habitat: Rich woods and ravines.

Native to: New Brunswick to Quebec to Minnesota, south through the Appalachians to Alabama, Georgia and North Carolina. In Georgia it is found in four northeastern mountain counties.

Comments: John Goldie, a nineteenth century British traveler, discovered this plant near Montreal. It was subsequently named in his honor. Goldie's Wood Fern is the largest of our native *Dryopteris* species.

Images: Page 20

Evergreen Wood Fern, Fancy Fern / *Dryopteris intermedia*

Characteristics: Fronds are finely dissected, lacy, dark green and glossy, 15 to 36 inches long. They are oval to narrowly triangular and bipinnate-pinnatifid to tripinnate. The stipe is covered with light brown scales. Sori are round and covered by kidney-shaped indusia.

Landscape uses: Use Fancy Wood Fern as a single specimen or in a mass planting. It does well in a moist, shady, woodland garden with acid to neutral soil.

Size: 18 to 36 inches high.

Zones: 3 to 8

Habitat: Rocky areas within cove forests.

Native to: Newfoundland west to Minnesota, south to north Georgia and Alabama.

Comments: Its large, lacy fronds make a dramatic statement in the landscape.

Images: Page 20

Southern Wood Fern / *Dryopteris ludoviciana*

Characteristics: Long, evergreen fronds are dark green, lustrous and leathery. Fertile pinnae are much narrower than sterile pinnae. Prominent veins run to the edges of tooth pinnules. Round sori, covered by kidney-shaped indusia, are borne on the upper half of the fertile blade.

Landscape uses: Southern Wood Fern makes an impressive sight in a shady fern garden with its tall, slender, glossy, dark-green fronds. The rhizomes branch readily, so a single plant will become 2 to 3 feet wide in several years.

Size: 3 to 4 feet high and 2 to 3 feet wide

Zones: 6 to 9

Habitat: Swamps and hammocks, damp woods, shaded limestone outcrops and edges of cypress swamps in the Coastal Plain.

Native to: North Carolina, southward and westward along the Coastal Plain to central Florida, Georgia, Alabama, Arkansas, Louisiana and Texas. In Georgia, it is found south of the fall line, mainly in southwestern counties.

Comments: The species name *ludoviciana* means "of Louisiana," where it was first discovered in the early 1800s.

Images: Page 21

Marginal Woodfern / *Dryopteris marginalis*

Characteristics: Evergreen fronds are lance-shaped, bipinnate-pinnatifid, leathery and bluish-green. The Marginal Woodfern rhizome is a low, broad, erect crown, densely covered with light brown scales. It tends to form a large, single-crowned specimen. Sori are prominent at the blade margins.

Landscape uses: This is the most drought-tolerant of the Wood Ferns. Plant it in shady areas, with its roots under a rock.

Size: 16 to 24 inches high and 18 to 24 inches wide

Zones: 2 to 7

Habitat: Rocky shaded ledges, rocky wooded slopes and rich, moist woodlands.

Native to: Ontario to Michigan, south to Oklahoma and northern Georgia. In Georgia, Marginal Woodfern is found in most of north Georgia, and as far south as Panola Mountain State Park in Rockdale County.

Comments: This tough plant is easy to cultivate.

Images: Page 21

DIxie Wood Fern, Hybrid Wood Fern / *Dryopteris X australis*

Characteristics: Fronds are dark green, slender, leathery and lustrous. They are widest in the middle and taper toward both ends. The stipe is covered with brown scales. The sori are arranged in rows parallel to the mid-vein.

Landscape Uses: Dixie Wood Fern should do well in average garden soil and shade but needs moist, rich humus to attain its full potential.

Size: 3 to 4 feet high and 2 to 3 feet wide

Zones: 5 to 9

Habitat: Swamps, hammocks and moist woodlands.

Native to: New York to Virginia, and south to Georgia and Louisiana.

Comments: Dixie Wood Fern is a sterile hybrid between Log Fern (*D. celsa*) and Southern Wood Fern (*D. lucoviciana*).

Image: Page 21

Genus *Polystichum* – Christmas Fern

Christmas Fern / *Polystichum acrostichoides*

Characteristics: Fronds are 12 to 28 inches long and lustrous green. The sterile fronds are shorter than the fertile fronds. The blade is lanceolate, pinnate and widest above the base. Pinnae are ½-inch wide, short-stalked, with bristle-toothed margins. Fertile pinnae are much narrower and smaller than sterile pinnae. Sori are round, usually in rows on each side of the midvein.

Landscape uses: Christmas Fern is very adaptable and does well in moist woodland gardens, among rocks and on shady red clay slopes. The rhizome can be dug and carefully divided to create more plants. Good drainage is essential, especially in the winter. It is easy to cultivate.

Size: 8 to 16 inches high and 14 to 24 inches wide

Zones: 3 to 10

Habitat: Moist woodlands, shaded slopes and ravines.

Native to: Abundant throughout eastern North America. It is one of the most common ferns in Georgia, except in the pine flatwoods of the southeastern part of the state.

Comments: Early New England settlers used this fern for Christmas decorations.

Images: Page 21

Genus *Woodsia* – Cliff Ferns

Common Woodsia, Blunt-lobed Woodsia, Cliff Fern / *Woodsia obtusa*

Characteristics: Fronds are clustered, gray-green and delicate. Fertile fronds are deciduous, while sterile fronds are evergreen. The stipe is 4 to 8 inches long and has conspicuous scales. The blade is widest near the middle. The rootstock is short-creeping. Sori are round and located at the leaf margins. Indusia are split and have a star-like appearance.

Landscape uses: This fern is easily grown in a mixed garden or rock garden in sun to partial shade with well-drained to slightly acid soil. The blades are more upright and thicker in sun than in shade. Dead fronds can be carefully clipped if the plants look untidy.

Size: 3 to 8 inches high and 3 to 6 inches wide

Zones: 3 to 9

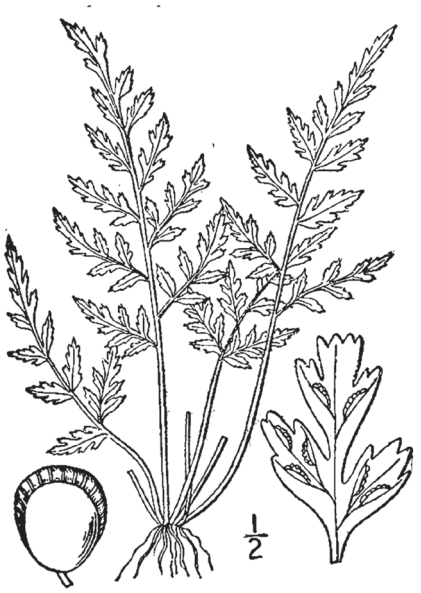
Habitat: Acidic or calcareous cliffs, granite outcrop edges, and well-drained rocky slopes in shaded woodlands.

Native to: Maine to Quebec and Ontario to Minnesota, south to Texas and Florida. It is found throughout Georgia, especially in the northern part of the state.

Comments: Relatively easy to cultivate.

Images: Page 22

Mountain Spleenwort / *Asplenium montanum*



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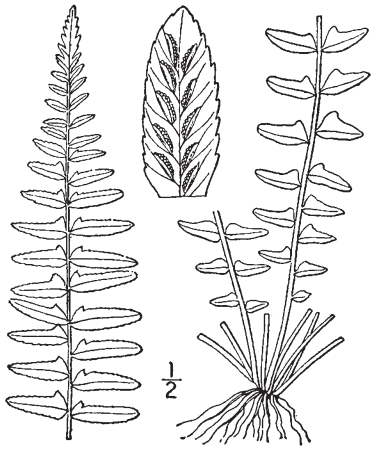
Tom Goforth

Troy Evans
Eastern Kentucky University,
Bugwood.org

Ebony Spleenwort / *Asplenium platyneuron*



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Sori on fertile frond
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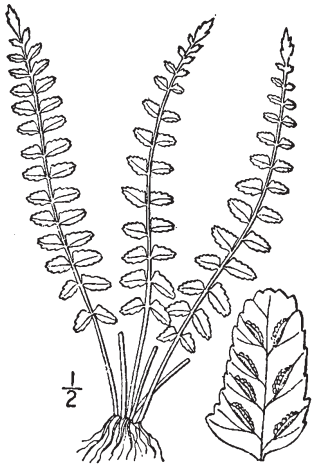
Black-stemmed Spleenwort / *Asplenium resiliens*



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Sori
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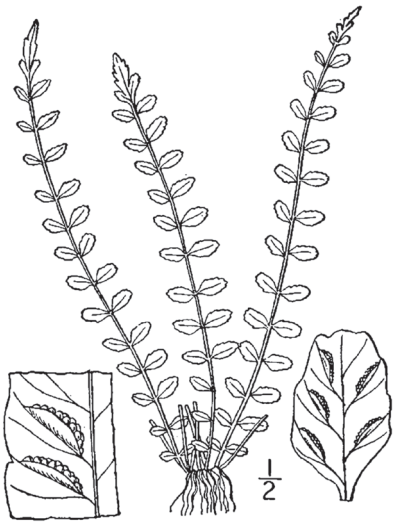
Maidenhair Spleenwort / *Asplenium trichomanes*



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Close-up of leaf with sori
Patrick J. Alexander
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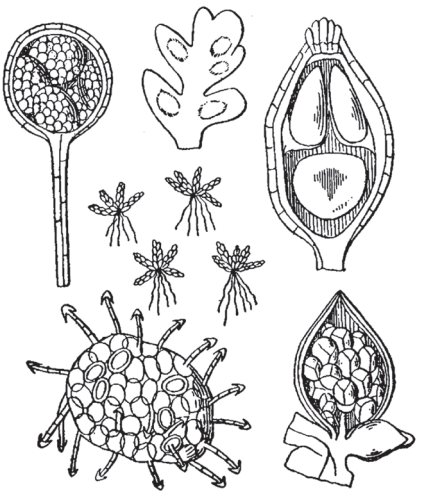
Carolina Mosquitofern / *Azolla caroliniana*



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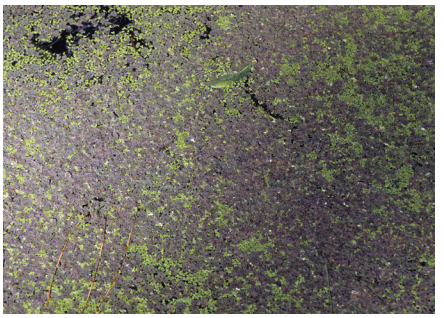

Gil Nelson

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Netted Chain Fern / *Woodwardia areolata*

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River to River CWMA, Bugwood.org

Fertile frond with sori
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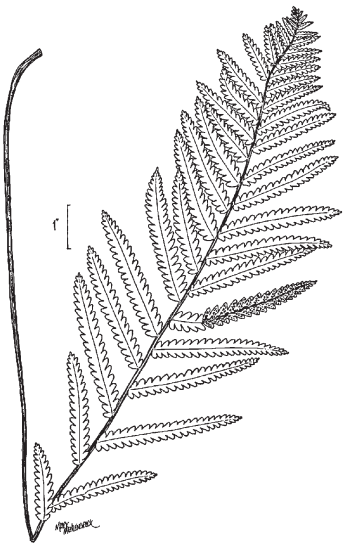
Virginia Chain Fern / *Woodwardia virginica*



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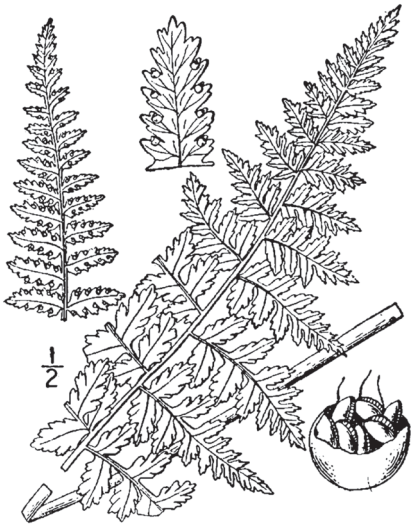
Eastern Hay-scented Fern / *Dennstaedtia punctilobula*



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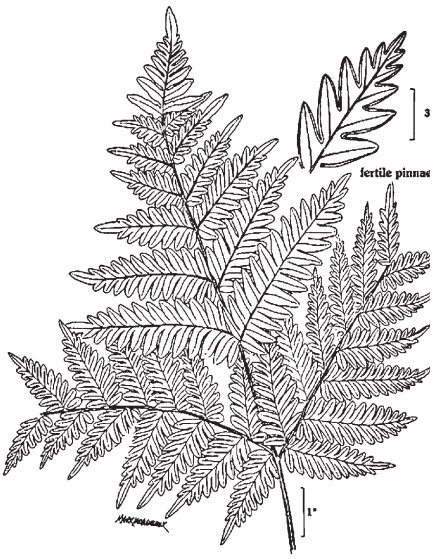
Bracken Fern / *Pteridium aquilinum*



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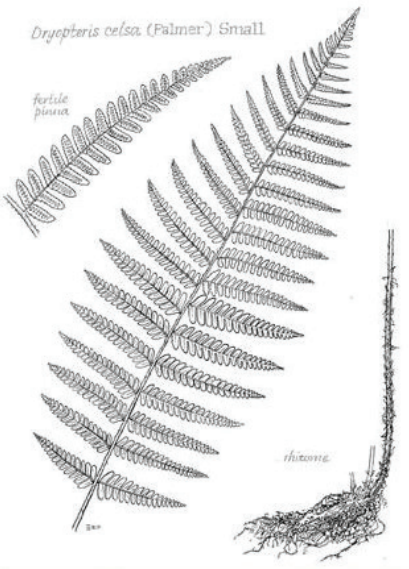
Log Fern / *Dryopteris celsa*



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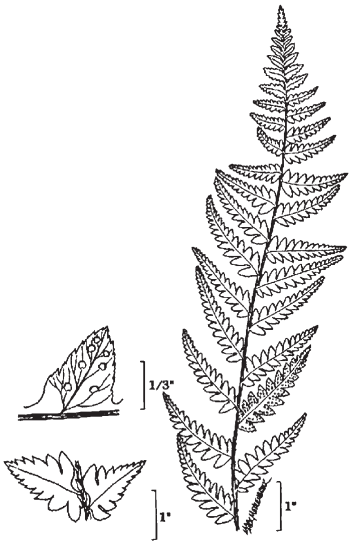
Crested Wood Fern / *Dryopteris cristata*



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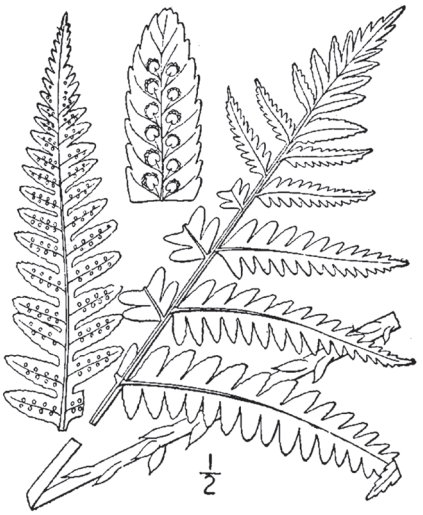
Goldie's Wood Fern, Giant Wood Fern / *Dryopteris goldiana*



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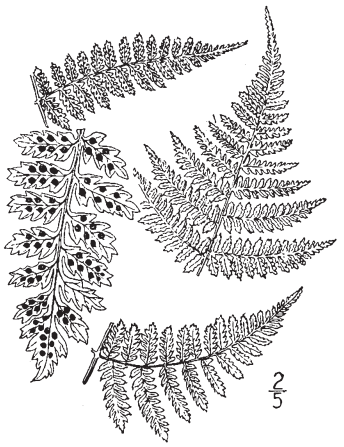
Evergreen Wood Fern, Fancy Fern / *Dryopteris intermedia*



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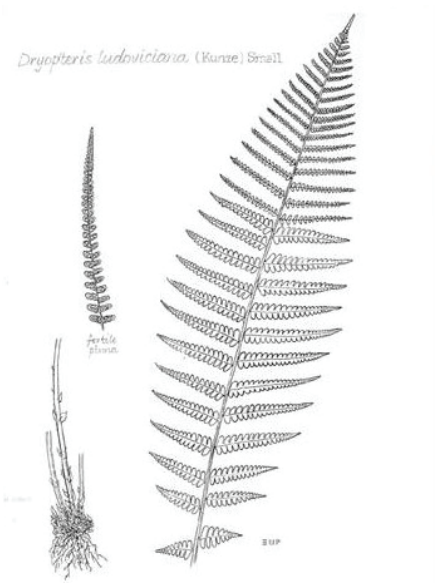
Southern Wood Fern / *Dryopteris ludoviciana*



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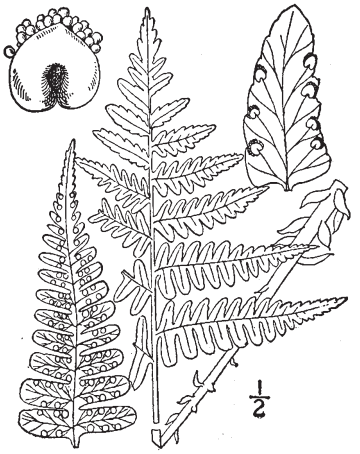
Gil Nelson

Marginal Woodfern / *Dryopteris marginalis*



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Dixie Wood Fern, Hybrid Wood Fern / *Dryopteris X australis*

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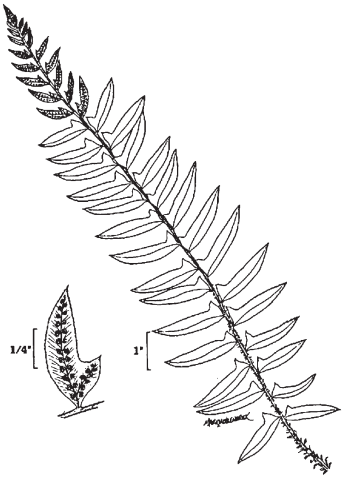
Christmas Fern / *Polystichum acrostichoides*



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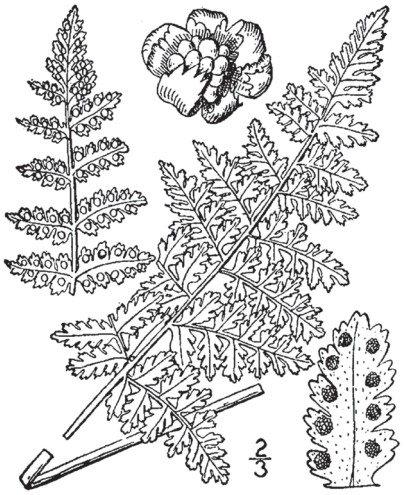
USDA Forest Service, Bugwood.org

Common Woodsia, Blunt-lobed Woodsia, Cliff Fern / *Woodsia obtusa*



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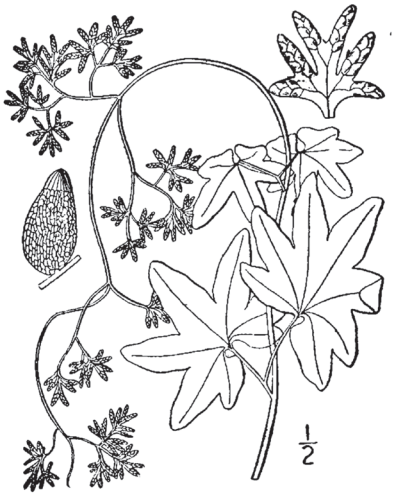
Climbing Fern, Hartford Fern / *Lygodium palmatum*



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Eastern Kentucky University
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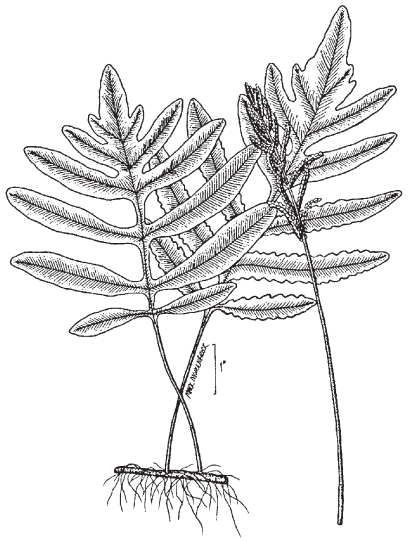
Sensitive Fern / *Onoclea sensibilis*



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Rattlesnake Fern / *Botrypus virginianum*

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Chris Evans
River to River CWMA, Bugwood.org

Tom Goforth

Southern Grapefern / *Sceptridium biternatum* (Syn. *Botrychium biternatum*)

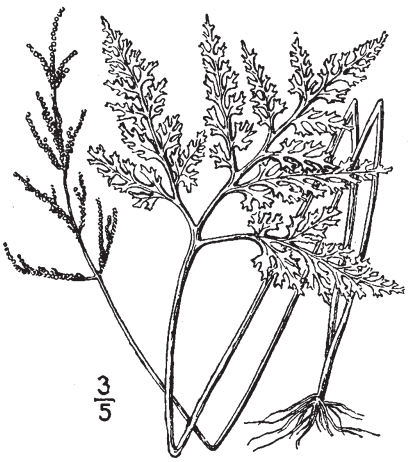
Hugh Nourse

Alabama Grapefern / *Sceptridium jenmanii* (Syn. *Botrychium jenmanii*)

A. Murray Evans and
B. Eugene Wofford
UTK Herbarium

A. Murray Evans and
B. Eugene Wofford
UTK Herbarium

Cut-leaf Grapefern or Dissected Grapefern / *Sceptridium dissectum* (Syn. *Botrychium dissectum*)



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Gil Nelson

Ed McDowell

Thomas G. Barnes
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Winter Grapefern / *Sceptridium lunarioides* (Syn. *Botrychium lunarioides*)

Warren D. Hauk
Department of Biology,
Denison University

Genus *Ophioglossum* – Adders-tongue Ferns

Common Adders-tongue Fern, *Ophioglossum vulgatum* (Syn. *O. pyncnostichum*)
Hugh Nourse

Bulbous Adders-tongue Fern, *Ophioglossum crotalophoroides*
Gil Nelson

Cinnamon Fern / *Osmunda cinnamomea*

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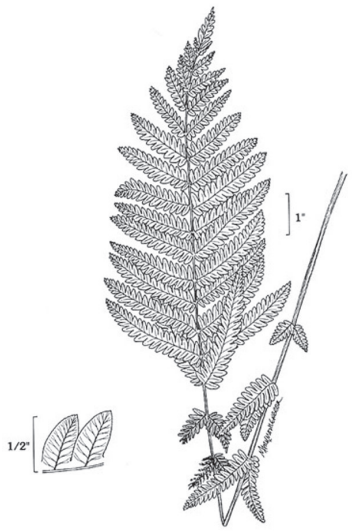
River to River CWMA, Bugwood.org

R.A. Howard
USDA-NRCS PLANTS Database

Tom Goforth

Interrupted Fern / *Osmunda claytoniana*



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Royal Fern / *Osmunda regalis*

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River to River CWMA, Bugwood.org

Troy Evans
Eastern Kentucky University
Bugwood.org

Jeff McMillian
USDA-NRCS PLANTS Database

Resurrection Fern / *Pleopeltis polypodioides*

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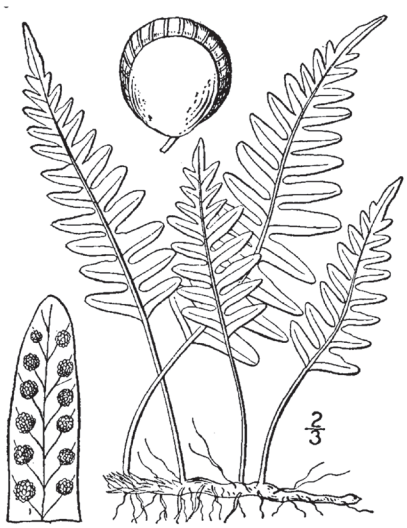
Common Rockcap Fern, Rock Polypody / *Polypodium virginianum*



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J.S. Peterson
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J.S. Peterson
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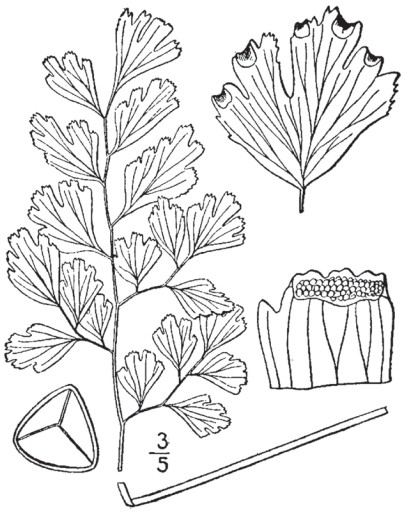
Southern Maidenhair Fern, Venus Hair Fern / *Adiantum capillus-veneris*



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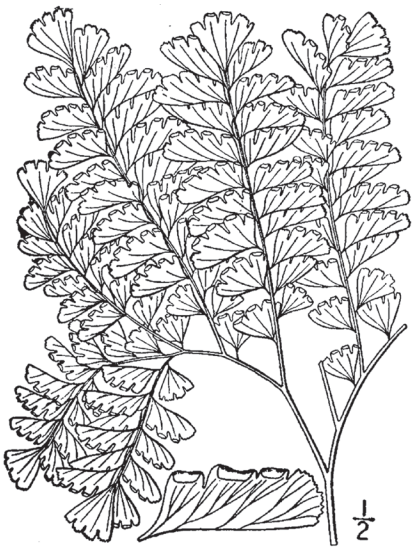
Gil Nelson

Ogden Archive

Northern Maidenhair Fern, Five-finger Fern / *Adiantum pedatum*



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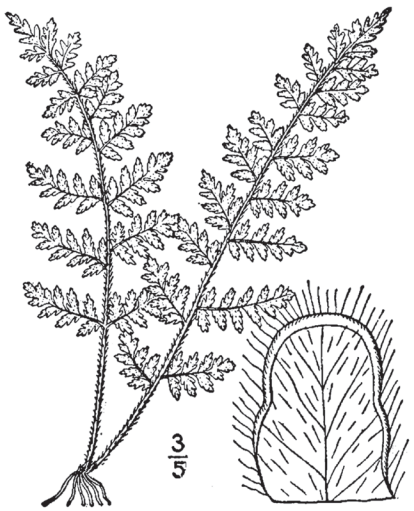
Hairy Lip-fern / *Cheilanthes lanosa*



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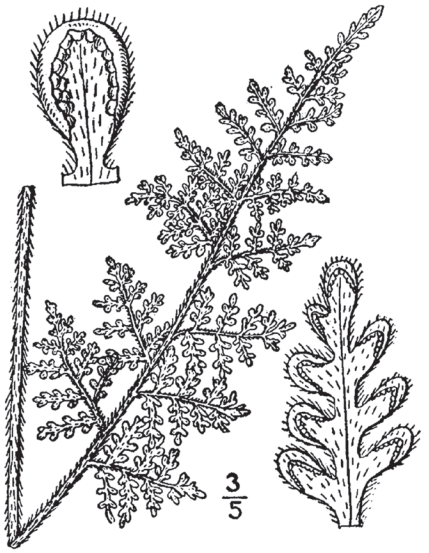
Woolly Lip-fern / *Cheilanthes tomentosa*



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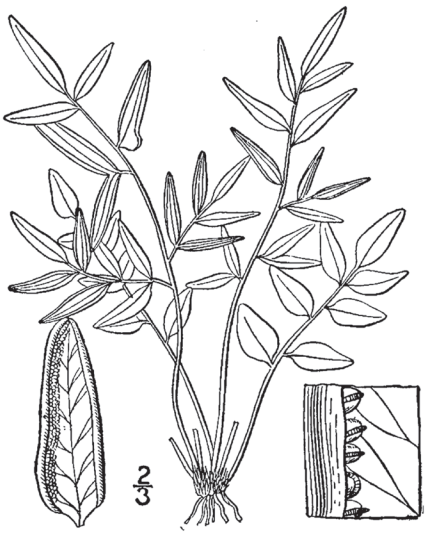
Purple Cliff-brake Fern / *Pellaea atropurpurea*



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Patrick J. Alexander
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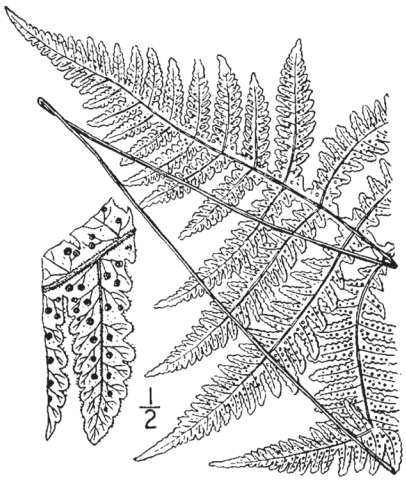
Broad Beech Fern / *Phegopteris hexagonoptera*



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Tom Goforth

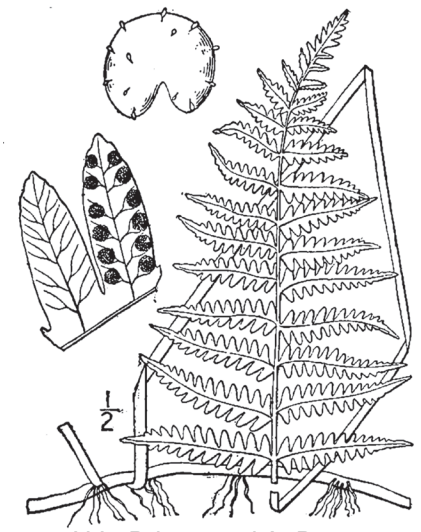
John Triana
Regional Water Authority, Bugwood.org

Southern Maiden Fern / *Thelypteris kunthii*

Gil Nelson

Sori
Gil Nelson

Marsh Fern / *Thelypteris palustris* var. *pubescens*



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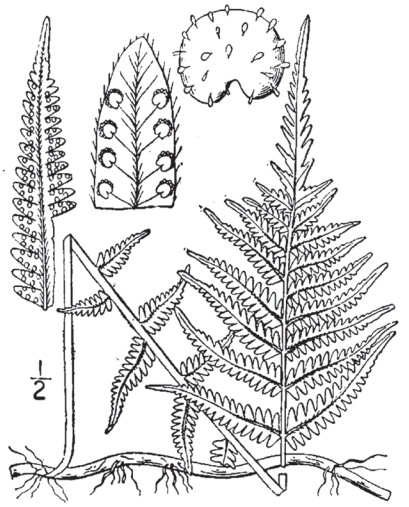
Gil Nelson

New York Fern / *Thelypteris noveboracensis* (syn. *Parathelypteris noveboracensis*)



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Tom Goforth

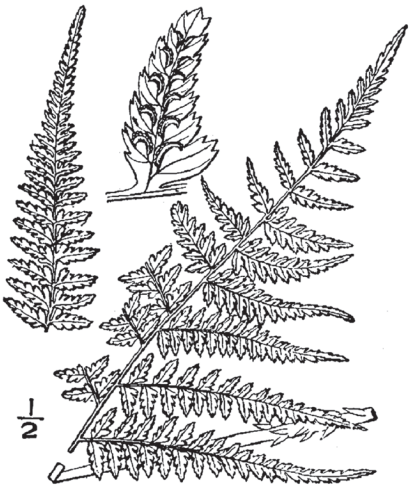
Ed McDowell

Gil Nelson

Ovate Maiden Fern / *Thelypteris ovata* var. *ovata* (syn. *Cristella ovata*, var. *ovata*)

Gil Nelson

Southern Lady Fern / *Athyrium asplenioides* (syn. *A. felix-femina* var. *asplenioides*)



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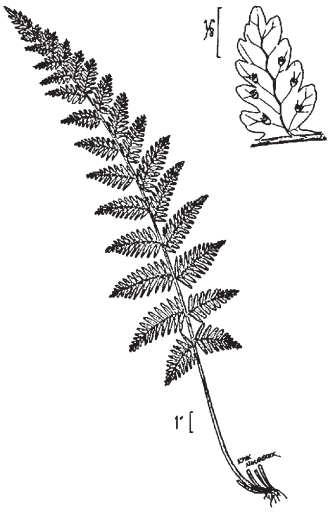
Chris Evans
River to River CWMA, Bugwood.org

Ed McDowell

Tom Goforth

Sori
Ed McDowell

Bulblet Bladder Fern / *Cystopteris bulbifera*



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Tom Goforth

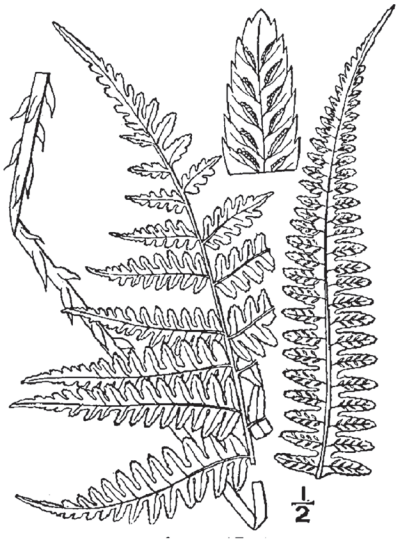
Patrick J. Alexander
USDA-NRCS PLANTS Database

Woodland Fragile Fern, Lowland Brittle Fern / *Cystopteris protrusa*

V. Fulford
hardyfernlibrary.com

Tom Goforth

Silvery Spleenwort / *Deparia acrostichoides*



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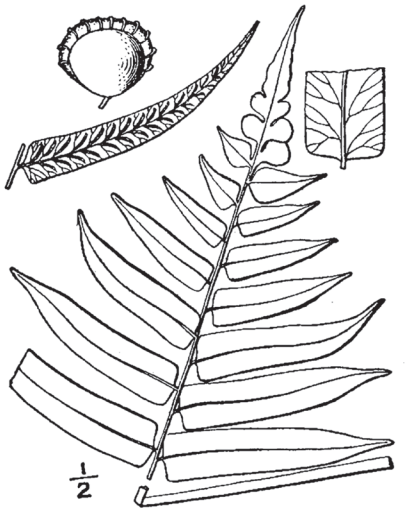
Tom Goforth

J.S. Peterson
USDA-NRCS PLANTS Database

Glade Fern / *Diplazium pycnocarpon* (syn. *Athyrium pycnocarpon*)



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The Climbing Fern Family – *Lygodiaceae*

Genus *Lygodium* – Climbing Ferns

There are two subtropical ferns in this genus, Japanese Climbing Fern (*Lygodium japonicum*) and Old World Climbing Fern (*L. microphyllum*), that have become serious invaders in Florida and the Gulf Coast states, as well as in Georgia. The shipment of pine straw out of Florida's infested areas is rapidly spreading these exotic pests. The native climbing fern (*Lygodium palmatum*) is not invasive like the subtropical species.

Climbing Fern, Hartford Fern / *Lygodium palmatum*

Characteristics: Fronds have pinnae every few inches that fork into two hand-shaped leaflets, each with three to seven fingers. The fronds are trailing and twining, attaching to supports. Those that fail to find a support bend over and creep along the ground. The spreading divisions of the sterile pinnules look like fingers of a hand. The fertile pinnae are smaller than the sterile pinnae and are on the upper part of the frond. The stipe is wiry and brownish-green, and the rachis is straw-colored.

Landscape uses: Climbing fern is a slow grower and difficult to cultivate or transplant. It needs moisture, physical support and abundant light.

Size: 3 to 4 feet high and 2 to 3 feet wide

Zones: 3 to 9

Habitat: Moist woodlands and thickets, wet slopes, sandy bogs with acidic soils rich in humus.

Native to: New Hampshire to New York, south to Louisiana and Georgia. In Georgia, it is only found in the northern part of the state, and populations are limited.

Comments: The genus name *Lygodium* comes from a Greek word meaning flexible and refers to the twining leaf-rachis. This is the only temperate member of this genus and our only native climbing fern. Climbing Fern was ruthlessly exploited during the nineteenth century for Christmas greenery and almost became extinct where it was once abundant. William Bartram, in his travels through Georgia, is thought to have seen climbing fern not far from Athens, Ga., between the Broad and Oconee rivers.

Images: Page 22

The Sensitive Fern Family - *Onocleaceae*

Sensitive Fern / *Onoclea sensibilis*

Characteristics: Sterile fronds have green or reddish stipes with pinnae opening to resemble a cupped hand. Fully expanded fronds are triangular. By late summer, fertile fronds arise from the light green mass of fine-textured sterile fronds. Sori are contained in bead-like structures on the ends of the fertile fronds.

Landscape uses: Use Sensitive Fern either as a specimen in a mass planting or as a groundcover around water or in wet areas. It grows in many locations, but it prefers wet soils and partial sun. It can be aggressive.

Size: 10 to 24 inches high and 2 to 3 feet wide

Zones: 2 to 10

Habitat: Roadside ditches, wet meadows or openings, swamp margins, wet, low woods and forests.

Native to: Newfoundland to Manitoba south to Texas and Florida. In Georgia, it is found throughout the state, but less frequently in the southeastern Coastal Plain.

Comments: The common name for this fern stems from the fact that it is sensitive to frost. The sterile fronds closely resemble those of Netted Chain Fern (*Woodwardia areolata*). However, Sensitive Fern fronds have smooth margins while those of Netted Chain Fern are finely toothed.

Images: Page 23

The Adder's Tongue Family – *Ophioglossaceae*

Genus *Botrypus* – Rattlesnake Ferns

Rattlesnake Fern / *Botrypus virginianum*

Characteristics: Usually, there are two distinct fronds: an arching divided sterile frond and an erect fertile frond. Fertile fronds arise from the base of the sterile fronds. The rhizome is subterranean, erect and fleshy, with thick, fleshy roots. Clusters of sporangia on the fertile fronds look like rattles on a snake. The fern is deciduous and disappears in the winter.

Landscape uses: Rattlesnake Fern does best in moist organic soils and filtered shade. Clip back woody vegetation regularly to keep it under control.

Size: 5 to12 inches tall and 8 to 18 inches wide

Zones: 4 to 9

Habitat: Moist deciduous woodlands.

Native to: Much of North America, Europe and Asia. In Georgia, it is found mostly in the northern half of the state and sporadically in southwestern and south central areas.

Comments: Slugs and snails are very fond of this fern. Cultivation is difficult. Rattlesnake Fern shares the same peculiar life cycle as the *Sceptridiums*, and is therefore difficult to cultivate or transplant.

Images: Page 23

Genus *Sceptridium* – Grapeferns

While most ferns are easily recognizable, the Grapeferns (*Sceptridium*) don't look like ferns when encountered for the first time. Although they are peculiar looking, they are ferns with an ancient lineage. Grapeferns get their name from the clustered sporangia on the fertile fronds, which resemble a cluster of grapes.

Grapeferns are difficult to cultivate by division or spores. The spores germinate only in a dark underground environment in the presence of a specific (unidentified) mycorrhizal fungus. Any attempt at transplantation will not succeed if the soil does not harbor the right mycorrhizal fungus. Therefore, they are listed below without cultural information.

Three Grapefern species and one fertile hybrid are native to Georgia: Southern Grapefern, Alabama Grapefern, Cut-leaf Grapefern and Winter Grapefern.

Southern Grapefern / *Sceptridium biternatum* (Syn. *Botrychium biternatum*) is found in moist forests, clearings and old fields. Fronds appear from August to October.

Images: Page 23

Alabama Grapefern / *Sceptridium jenmanii* (Syn. *Botrychium jenmanii*) is found in moist and dry forests and disturbed areas. Fronds appear from August to October. This species probably arose as a hybrid between *B. biternatum* and *B. lunarioides*.

Images: Page 24

Cut-leaf Grapefern or Dissected Grapefern / *Sceptridium dissectum* (Syn. *Botrychium dissectum*) is found in moist forests, clearings and old fields. Fronds appear from August to October.

Images: Page 24

Winter Grapefern / *Sceptridium lunarioides* (Syn. *Botrychium lunarioides*) is found in northern Georgia in scattered locations in old fields, pastures and young forests. Fronds appear from January to April.

Comments: The way to differentiate Rattlesnake Ferns from Grapeferns is that the fertile frond of Rattlesnake Fern emerges from the base of the blade, while the fertile frond of Grapefern originates from the base of the plant.

Image: Page 24

Genus *Ophioglossum* – Adders-tongue Ferns

Five species of Adders-tongue Ferns are found in Georgia. They are not likely garden plants but they are of botanical interest. They share the same ancient lineage as the Grapeferns, with the same peculiar life cycle. Most of the species are difficult to establish, cultivate or transplant due to a required association with mycorrhiza (soil-borne fungi). Therefore, it's best to observe them in the wild and not attempt landscape culture.

The rhizome is subterranean, fleshy, short and upright. The sterile frond is oval to lance-shaped. A fertile spike arises from the base of the sterile frond with two vertical rows of large sporangia.

Adders-tongue ferns are easy to overlook in moist meadows, ditches and other disturbed grassy habitats in the open or light shade. The most likely time to spot them is in late winter. Cemeteries are a good place to look for them.

Images: Page 25

The Royal Fern Family – *Osmundaceae*

The Royal Fern family is notable for its long, successful journey through time. Fossilized specimens, resembling today's species, date from the late Triassic Period (220 million years ago).

Cinnamon Fern / *Osmunda cinnamomea*

Characteristics: Large cinnamon-colored fertile fronds arch from the central rhizome-like palm fronds. As the fiddleheads emerge in the spring, they are covered by silvery-white hairs that turn bronze with maturity. Fertile fronds bear masses of green sporangia. They shed their spores, turn brown and collapse by midsummer. The medium green, pinnate-pinnatifid sterile leaves last well through the summer before turning yellow or bronze in fall. The pinnae are lance-shaped and deeply lobed. The stipe is densely hairy when young.

Landscape uses: Use in wetland areas. It likes its roots in water, either at a lake or pond edge, or in other areas where water naturally collects. When provided these conditions, it is easy to cultivate.

Size: 2 to 5 feet high and 2 to 4 feet wide

Zones: 3 to 10

Habitat: Wet, acidic soils, swamps, sphagnum bogs, wet woods and along streams.

Native to: North America; it is found throughout Georgia.

Comments: Hummingbirds collect the soft down from the hairy stipes to line their nests. *Osmunda* fiber, a fibrous mass of dried fern roots and stipe tissue, is used as a potting medium for orchids and epiphytes.

Images: Page 25

Interrupted Fern / *Osmunda claytoniana*

Characteristics: Fronds are pinnate-pinnatifid with distinct sporangia borne on several pairs of pinnae in the middle of the fronds. The clusters of sporangia on the fertile fronds look like miniature clusters of grapes. These fertile pinnae, with vegetative pinnae above and below them, give an "interrupted" effect to the appearance of the frond.

Landscape uses: This fern is best used only at higher elevations in north Georgia. Use it along fences, walls and foundations. It prefers slightly acidic soil, even moisture and cool temperatures.

Size: 2 to 4 feet high and 3 to 4 feet wide

Zones: 3 to 7

Habitat: Damp woodlands, roadsides and meadows at high elevations.

Native to: Newfoundland, Ontario and Minnesota, south to northern Georgia and northern South Carolina.

Comments: Interrupted fern is a poor choice for areas with hot summers and elevated night temperatures. Given the right growing environment, it can be a majestic specimen.

Images: Page 25

Royal Fern / *Osmunda regalis*

Characteristics: The sterile fronds are broadly triangular and strongly bipinnate, with the pinnae getting progressively smaller as they alternate up the rachis. New, green-colored fertile fronds turn tawny brown as the season progresses. The stipe is smooth and straw-colored. The rachis is green with scattered hairs.

Landscape uses: Plant Royal Fern on fertile, wet soils at a pond edge or lakeside. It needs several years to mature into a full-size specimen. When it does, it becomes a focal point in a woodland garden.

Size: 2 to 4 feet high and 2 to 3 feet wide (6 feet high under ideal cultural conditions)

Zones: 3 to 9

Habitat: Wet woods, cypress and creek swamps, and spongy depressions with acidic soil.

Native to: Widespread throughout eastern North America, including all of Georgia.

Comments: This is a large plant with handsome fronds. It is easy to cultivate when provided with the right environment. The species name, *regalis*, means royal, referring to its bold, elegant fronds.

Images: Page 26

The Polypody Family – *Polypodiaceae*

Genus *Pleopeltis* – Resurrection Fern

Resurrection Fern / *Pleopeltis polypodioides*

Characteristics: Evergreen fronds are lance-shaped with 8 to 14 pairs of pinnae. The pinnae are densely scaled on the lower surface and smooth on the upper surface. Older fronds wither and die at the base of the plant, acting like a net to trap nutrient-rich debris and rain. New fronds appear in spring and sometimes in the fall. The long-creeping, fuzzy rhizome sends out short, wiry roots to anchor the plant and to absorb water and nutrients.

Landscape uses: Use Resurrection Fern as an accent plant in the shaded rock or woodland garden. It is a tough plant, once established. However, getting this epiphyte started on a tree trunk, a mossy boulder or a rotten log is a challenge that requires ingenuity, patience, attention to water requirements, and luck.

Size: 3 to 6 inches high and 6 to 12 inches wide

Zones: 6 to 10

Habitat: Rock outcrops, tree trunks and limbs, rotten logs, moss-covered rocks and old shingled roofs.

Native to: Maryland to southern Kansas, south to Texas and Florida. Resurrection Fern is one of the more common ferns found throughout Georgia, especially in the coastal area.

Comments: The common name, Resurrection Fern, arises from the fact that the fronds curl up tightly from lack of moisture and appear dead until they are revived and “resurrected” by rain.

Images: Page 26

Common Rockcap Fern, Rock Polypody / *Polypodium virginianum*

Characteristics: Fronds are evergreen. The blade is 3 to 8 inches long and ½- to 2½ inches wide, thick textured, bright green above, light green below and smooth on both sides. Fronds have 11 to 18 pairs of oblong-shaped pinnae with rounded tips. The sori are large and arranged in rows on each side of the mid-vein. They are yellowish when young, turning dark brown with age.

Landscape uses: Rockcap Fern presents the gardener with the same cultural challenges as Resurrection Fern. Plant it in the crevices of rocks or on rotted logs in moist, shaded sites.

Size: 3 to 10 inches high and 8 to 16 inches wide

Zones: 2 to 8

Habitat: Shaded cliffs, mossy boulders and lower trunks of trees. It is most often found growing on rocks. Although it may appear to grow on bare rock, the rhizomes and roots trap leaves and other debris to build up a thin layer of organic soil in which the fern grows.

Native to: Newfoundland to northern Alberta, south to Arkansas and northern Georgia. The southernmost sites in Georgia are rocky bluffs in Clarke County, Sope Creek in Cobb County, and Carroll County.

Comment: Rockcap Fern resulted from a cross between two other species, *P. appalachianum* and *P. sibiricum*.

Images: Page 26

The Maidenhair Fern Family – *Pteridaceae*

Genus *Adiatum* – Maidenhair Ferns

Few ferns match the arresting beauty of the two Georgia-native *Adiantum* fern species: Southern Maidenhair and Northern Maidenhair. The genus name comes from a Greek word, *adiantos*, which means "unwetted," and refers to the way the leaves of these ferns shed rain, at least when the fronds are young. These delicate-looking ferns are relatively easy to cultivate when properly sited in the garden.

Southern Maidenhair Fern, Venus Hair Fern / *Adiantum capillus-veneris*

Characteristics: Arching, bright green, evergreen fronds are bipinnate to tripinnate with fan-shaped pinnules held on shiny black or brown stipes. One sorus develops on the underside of each lobe of the pinnules. A spreading rootstock creeps through the soil to form compact colonies.

Landscape uses: Easily cultivated in damp, sheltered spots in filtered shade. It needs moist, alkaline soil.

Size: 10 to 20 inches high and 12 inches wide

Zones: 7 to 10

Habitat: Wet limestone rocks, moist cliffs, limestone sinks and bluffs, and wet, rocky, river banks.

Native to: Southern and western North America, northward to South Dakota. In Georgia, it occurs in southwestern counties and a few Piedmont counties that have suitable soil.

Comments: Southern Maidenhair Fern is one of the most beautiful native ferns. Careful attention must be paid to watering the first season after planting to prevent drying out until new roots become established. After establishment, it is moderately drought tolerant, going dormant but recovering with rainfall.

Images: Page 27

Northern Maidenhair Fern, Five-finger Fern / *Adiantum pedatum*

Characteristics: The main rachis of the frond forks in half and the two parts curve outward, each with three to five finger-like divisions bearing 12 to 20 pairs of delicate segments. The peculiar branching pinnae give the fronds a fan-like appearance. A short-creeping rhizome forms colonies. The sori are oblong and are on the margin of each pinnule segment. The plant is deciduous.

Landscape uses: This fern does well under a variety of garden situations if provided well-drained, alkaline to slightly acidic soil enriched with humus. It forms large clumps in filtered shade. Mature clumps can be divided to establish new colonies.

Size: 1 to 2 feet high and 2 feet wide

Zones: 2 to 8

Habitat: Shaded woodland slopes with moist, alkaline to slightly acidic soil.

Native to: Nova Scotia and Prince Edward Island to Minnesota, south to Oklahoma. In Georgia, Northern Maidenhair Fern is found mainly in mountain and southern piedmont counties.

Comments: Newly-planted ferns need irrigation during establishment.

Images: Page 27

Genus *Cheilanthes* – Lip-ferns

The Lip-ferns are well adapted to dry habitats and deserve to be more widely cultivated in sunny rock gardens. The name *Cheilanthes* comes from the Greek word meaning "lip" and describes the way the sori near the blade margins are in-rolled and look like lips.

Several species within this genus are native to the southwestern states and Mexico. In the eastern United States, Lip-ferns are found mainly on outcrops and ledges in the Appalachians and other rocky areas. Two of the most common species in Georgia are described here: Hairy Lip-fern and Wooly Lip-fern.

Hairy Lip-fern / *Cheilanthes lanosa*

Characteristics: Fronds are 8 to 15 inches long, dark green and evergreen. They curl up when dry, but they revive with rain. Fertile fronds may break off in winter, while the shorter sterile fronds remain evergreen. The rachis is dark brown and hairy. The blade is oblong, lanceolate and broadest near the middle. Sori are borne along the edges of the pinnae and are covered by the reflexed leaf margins. The short-creeping rootstock is slender and covered with brown, narrow, toothed scales.

Landscape uses: Plant Hairy Lip-fern in rock crevices or between large stones. Good drainage is essential. Use a mixture of humus with abundant coarse sand, grit or gravel. Overwatering can rot the crown. Once established, this fern will survive long dry periods, especially if its roots are kept cool among large rocks.

Size: 7 to 8 inches high by 6 to 8 inches wide

Zones: 5 to 9

Habitat: Non-calcareous rocky slopes, outcrops, ledges, cliffs and rocky locations exposed to sun and wind.

Native to: Common in Georgia from the granite region of the Piedmont northward to the mountains.

Comments: Plants may be hard to locate; however, this fern can be grown easily from spores.

Images: Page 27

Woolly Lip-fern / *Cheilanthes tomentosa*

Characteristics: Fronds are tufted, bright green and evergreen. The pinnae are oblong to linear, with white curly hairs above and densely matted hairs below. The hairs are silvery white on young ferns and become light brown with age. They are most evident when the fronds are expanding. The stipe is brown and covered with tan hairs and narrow scales. The sori are marginal and covered by a reflexed leaf margin.

Landscape uses: Use Woolly Lip-fern in rock crevices and between stones. Plant it in a humus/sand medium. Once established, it can survive dry periods.

Size: 10 to 20 inches high and 10 inches wide

Zones: 6 to 9

Habitat: Well-drained sunny sites on rocky outcrops and cliffs of granite, sandstone and/or calcareous rocks.

Native to: West Virginia to Missouri, west to Arizona and south to Texas and Georgia. In Georgia, it is found on rocky, exposed sites in northern counties.

Comments: Woolly Lip-fern is somewhat larger than Hairy Lip-fern.

Images: Page 28

Genus *Pellaea* – Cliff-brake Ferns

Purple Cliff-brake Fern / *Pellaea atropurpurea*

Characteristics: Evergreen fronds are closely bunched, gray-green and leathery. Fertile fronds are larger than the sterile fronds. Both stipe and rachis are dark purple and hairy. The sori are at the leaf margins, and the leaf margins curve inward to protect the sporangia.

Landscape uses: Use Purple Cliff-brake as a specimen plant in partial shade within a rock garden. It requires good drainage and calcareous rocks, so amending with limestone gravel is recommended. A soil mixture of equal parts limestone gravel, sand and topsoil with a handful of compost should provide a good growing medium.

Size: 3 to 10 inches high and 6 to 10 inches wide

Zones: 4 to 9

Habitat: Calcareous cliffs, rocks crevices, and ledges.

Native to: Widely distributed in temperate North America and Mexico. In Georgia, Purple Cliff-brake is found mainly in the Ridge and Valley counties and in a few locations in the Chattahoochee/Flint/Ocmulgee drainage area.

Images: Page 28

The Marsh Fern Family – *Thelypteridaceae*

Genus *Phegopteris* – Beech Fern

Broad Beech Fern / *Phegopteris hexagonoptera*

Characteristics: Sterile fronds are deciduous and muted green in mid- to late spring. The rachis is green and winged with six angles. Fronds are bipinnatifid, broadly triangular and broadest at the base. Lower surfaces have fine hairs. The segments are connected to each other by wings on the rachis. Fertile fronds are few, appearing late in the season. Sori are round, marginal and lack indusia. The slender rootstock is long-creeping.

Landscape uses: Broad Beech Fern is best used for massing as a deciduous ground cover in moist, shady woodlands. Fronds sprout throughout the growing season, creating a canopy so dense it hides the ground and stifles weeds; however, it does not overpower other companion plants such as hosta. The shallow rhizomes can be easily dug if the plant gets out of bounds.

Size: 12 to 26 inches high and 3 feet wide

Zones: 4 to 9

Habitat: Moist, humus-rich, well-drained woodlands and cool, shaded slopes.

Native to: Maine and southern Quebec to Minnesota, south to Texas and Florida. Broad Beech Fern is common throughout northern Georgia, and is sometimes found in southwestern Georgia.

Comments: Slugs can be a problem.

Images: Page 28

Genus *Thelypteris* – Marsh Ferns

The Marsh Ferns comprise one of the largest genera of ferns, most of which are native to tropical rainforests. Just a few species are found in the temperate zone. The genus has undergone taxonomic revision in the past and is still being debated by taxonomists.

Southern Maiden Fern / *Thelypteris kunthii*

Characteristics: Long, light-green fronds emerge from a short-creeping rhizome, which results in clumps of fronds not far from the mother colony. The blade is pinnate-pinnatifid, lanceolate, with a long tapering tip. It is hairy on both the upper and lower surface. The rachis is straw colored. Sori are kidney shaped.

Landscape uses: Use this fern for massing or as a specimen in a woodland garden. It prefers moist soil, but will tolerate clay soil and summer drought fairly well. In time, it will spread to become a large colony.

Size: 28 to 40 inches high and 3 to 4 feet wide

Zones: 7 to 10

Habitat: Grows in wet calcareous soils, as well as moderately dry, somewhat acidic soils. It can be found in rock crevices, swampy woods, stream banks, drainage ditches and under bridges.

Native to: South Carolina to Texas and northward to southern Arkansas. It is common in southern Georgia, ranging northward to Putnam County.

Comments: Southern Maiden Fern is one of the best large ferns for the Deep South. It is easy to cultivate.

Images: Page 29

New York Fern / *Thelypteris noveboracensis* (syn. *Parathelypteris noveboracensis*)

Characteristics: Fronds are deciduous and light yellow-green. Fertile fronds are slightly larger than sterile fronds. The blade is pinnate-pinnatifid, ellipitical and tapering at both ends. The lowest pinnae are winged and stretch to the ground. Sori are small, circular and found near the margins of the pinnae. The rootstock is slender and long-creeping.

Landscape uses: Use for massing along streams and ponds in shade or filtered sun. It can be aggressive and difficult to confine.

Size: 12 to 24 inches tall and 2 to 3 feet wide

Zones: 4 to 8

Habitat: Wet to moist soils and stream floodplains in partial sun to shade.

Native to: Newfoundland to Ontario to southern Louisiana and Georgia. Common in northern Georgia, and ranging southward to Harris and Oglethorpe counties.

Comments: Easy to cultivate and an aggressive grower.

Images: Page 29

Ovate Maiden Fern / *Thelypteris ovata* var. *ovata* (syn. *Cristella ovata*, var. *ovata*)

Characteristics: Fronds are pinnate-pinnatifid, broad at the base and tapering toward the tip. The pinnae are alternate, hairy below and smooth above. They have deeply cut lobes. The rachis is straw colored. Sori are small and round with kidney shaped indusia.

Landscape uses: Use Ovate Maiden Fern in moist woodland gardens. It makes a bold statement in the landscape when provided with the right environment.

Size: 16 to 40 inches high and 2 to 3 feet wide

Zones: 8 to 10

Habitat: Wet, calcareous soils, hammocks and moist woods in the Coastal Plain.

Native to: South Carolina, south to southern Florida, west to south Alabama.

Comments: In size and description, this fern is similar to Southern Maiden Fern (*Thelypteris kunthii*). However, Ovate Maiden Fern has slightly longer blades than Southern Maiden Fern and its pinnae are hairy only on the lower surface, whereas the pinnae of Southern Maiden Fern are hairy on both the upper and lower surfaces. It is easy to cultivate.

Image: Page 29

Marsh Fern / *Thelypteris palustris* var. *pubescens*

Characteristics: Fronds are 18 to 36 inches long, delicate, dull green, deciduous and arise from a black, wide-creeping rootstock. The rachis is green and hairy. The pinnae stop abruptly and do not taper toward the base of the blade. The stipe is 9 to 15 inches long. Sori are round, located near the mid-vein and partially concealed by curled margins.

Landscape uses: Marsh Fern can be attractive in cultivation when given the right growing conditions. The long-creeping rhizome can be aggressive, but when kept in a pure stand or mixed with flowering plants, such as iris, it can create an attractive picture. Because of its large size, use it as a background plant on a moist, shaded site.

Size: 1 to 3 feet high and 2 to 3 feet wide

Zones: 2 to 10

Habitat: Bogs, marshes (including freshwater tidal marshes) and bottomland forests.

Native to: Newfoundland and Manitoba, south to Florida and Texas.

Comments: Linnaeus described Marsh Fern in 1753. The species name "*palustris*" means "of marshes," where it commonly grows. The fronds tend to face toward the prevailing light. It is easy to cultivate.

Images: Page 29

The Lady Fern Family – *Woodsiaceae*

Genus *Athyrium* – Lady Ferns

Southern Lady Fern / *Athyrium asplenioides* (syn. *A. felix-femina* var. *asplenioides*)

Characteristics: Fronds are finely divided, delicate and broadest near their base. Pinnae are alternate along the rachis. Frond color ranges from yellowish-green to medium green. They are deciduous. The stipe is yellowish green or reddish and the rachis is yellowish green to reddish, smooth, flat or slightly grooved in front. A short-creeping rootstock produces a diffuse crown of fronds.

Landscape uses: Use Southern Lady Fern as a specimen or in groups in a woodland garden, under shrubs or next to foundations. It has brittle stipes that tend to break, so do not plant it in windy areas, directly under roof overhangs where rain cascades, or where animals and children may run through it. It is moderately drought tolerant, going dormant during drought and then re-sprouting when rains return. It transplants easily if given sufficient water until established.

Size: 20 to 30 inches high by 2 feet wide

Zones: 4 to 10

Habitat: Moist woods, roadside banks, along streams, and swamp margins.

Native to: Northern Florida, west to Texas and northward to Missouri and Massachusetts. It is found throughout most of Georgia, except the pine flatwoods in the southeastern part of the state.

Comments: There are several species of Lady Ferns found in North America, Central and South America, and Eurasia, but only this species is native to Georgia.

Images: Page 30

Genus *Cystopteris* – Bladder Ferns

Bulblet Bladder Fern / *Cystopteris bulbifera*

Characteristics: Fronds are 10 to 20 inches, delicate, pale green and deciduous. The rachis is smooth and straw-colored. The blade is widest at or near the base, tapering gradually to a very long apex. Pinnules are oblong and toothed. The rootstock is short-creeping.

Landscape uses: Bulblet Bladder Fern is easy to cultivate. It needs partial sun to shade and moist, well-drained soil. It is one of the earliest ferns to emerge in spring. By July it starts to die back.

Size: 1 to 2 feet high and 1 to 2 feet wide

Zones: 3 to 9

Habitat: Shaded calcareous cliffs where water drips after rain.

Native to: Newfoundland to Quebec, south to Arkansas and northern Georgia. In Georgia, it is restricted to a few mountainous sites in the northwest corner of the state.

Comments: This fern has an interesting an unusual asexual reproduction method. It produces small, green fleshy bulblets on the underside of fronds near the axils of pinnae. hey drop off and when the environment is suitable, sprout and grow into new plants. It also reproduces from spores.

Images: Page 30

Woodland Fragile Fern, Lowland Brittle Fern / *Cystopteris protrusa*

Characteristics: Loosely clustered fronds are delicate and lacy. They are dark green above and light green below. They appear in early spring, disappear during summer, and reappear in the fall. The stipe is light green or tan with a darkened base. It is smooth, brittle and grooved on the upper surface. Sori are round and located near the margins of the pinnae. The spreading rootstock grows up to 10 inches wide.

Landscape uses: Woodland Fragile Fern likes moist, organic soils with a neutral pH. It is a strong grower. The rhizome branches freely to form colonies that are easily divided. It often turns brown in midsummer, but sends it up new fronds in fall that last until frost.

Size: 6 to10 inches high and 10 inches wide

Zones: 5 to 9

Habitat: Moist humus-rich woodland soils, along streams, and on moist, sheltered ledges.

Native to: From New York to Minnesota to the southeastern states. In Georgia, it grows in a number of northern counties as far south as Fulton county.

Images: Page 30

Genus *Deparia* – Spleenworts

Silvery Spleenwort / *Deparia acrostichoides*

Characteristics: Fronds are green and deciduous. They are brittle and easily broken. The stipe is light green above, dark green below, and covered with narrow scales and fine hairs. The sori are silvery white and are arranged in rows on each side of the pinnae mid-veins. The rhizome is slender-creeping.

Landscape uses: Silvery Spleenwort is easy to grow in moist, fertile soils. It should not be allowed to dry out in summer. It makes a good companion for woodland wildflowers. Since it is deciduous, it fades away in the winter landscape.

Size: 18 to 30 inches high by 2 to 3 feet wide

Zones: 4 to 8

Habitat: Moist, fertile woods, with ample humus, along stream banks.

Native to: Asia as well as the eastern United States and Canada, ranging south to northern Georgia and west to Louisiana.

Images: Page 31

Genus *Diplazium* – Glade Ferns

Glade Fern / *Diplazium pycnocarpon* (syn. *Athyrium pycnocarpon*)

Characteristics: Fronds are deciduous, 24 to 30 inches long and wide. It is dimorphic, with sterile and fertile fronds on the same plant. Sterile fronds are slightly arching and shorter than fertile fronds. The fertile fronds appear in late summer and have long, straight sori arranged in a herringbone pattern on the lower surface of the pinnae.

Landscape uses: Glade fern likes calcareous soils. If mature fronds appear pale green, apply dolomite lime to make the soil more alkaline. It will survive short dry periods, although it does best in moist, fertile soil.

Size: 1½ to 3½ feet tall and 2 to 3 feet wide

Zones: 4 to 9

Habitat: Shady, moist woods and rocky slopes with alkaline soil.

Native to: New Hampshire to Minnesota, south to northwestern Louisiana and northern Florida. In Georgia, it is found in a few northern counties.

Comments: This fern is a dense clumper and will spread to form a large stand over time.

Images: Page 31

Glossary

Antheridium (*pl.* antheridia): a sperm-producing structure that may be multicellular or unicellular.

Apogamous: producing diploid spores.

Appressed: pressed close to or flat against a surface.

Archegonium (*pl.* archegonia): a multicellular structure in which a single egg is produced; found in mosses, ferns and some vascular plants.

Bipinnate: once divided.

Bipinnate-pinnatifid: twice divided with the second division broadly attached.

Bipinnatifid: once divided, broadly attached.

Blade: the broad part of a leaf.

Circumneutral: close to neutral, a pH between 6.5 and 7.5.

Crosier: a fiddlehead; the coiled developing leaf of a fern.

Dimorphic: occurring in two distinct forms. In some ferns, the sterile and fertile fronds have a markedly different appearance.

Disjunct: geographically separated.

Epiphite (*adj.* epiphytic): a plant that grows on another plant for support, but does not derive nourishment from the supporting plant.

Frond: the leaf (usually compound) of a fern; a large compound leaf of another plant, as a palm, or leaf-like structures of some seaweeds or lichens.

Gametophyte: in plants, such as ferns, that have an alternation of generations, this is the gamete-producing generation.

Glabrous: bald, naked, hairless.

Glandular: having an organ, or layer of cells, that produces and secretes some substance.

Hammock or hummock: a low mound or ridge of earth.

Indusium (*pl.* indusia): a small membrane or flap covering the sorus in ferns.

Lanceolate: narrow and tapering at each end.

Lax: scattered; widely spaced.

Lithophyte: a plant that grows on rocks.

Mafic rock: magnesium-, iron- and calcium-containing rock.

Meiospore: One of four spores arising from the spore mother cell.

Mycorrhizal fungus: a fungus that has a symbiotic association with another plant.

Oblanceolate: broad and rounded at the tip and tapering at the base.

Once-pinnate: once divided into pinnae.

Palmate: divided from a central area, like the fingers of a hand.

Peltate: supported, umbrella-like, on a central stalk rather than at or near the margin.

Pinna (*pl.* pinnae): a primary division or leaflet of a divided leaf or frond.

Pinna rachis: the midrib of the pinna.

Pinnate: feather-like in structure, with the parts (leaflets) arranged on both sides of a center line (midrib or midvein).

Pinnatifid: divided or sectioned, but not all the way to the midrib or midvein; broadly attached.

Pinnule: a secondary division of a fern leaf; a division of a pinna that is narrowed at the base.

Pocosin: an upland swamp of the Coastal Plain of the southeastern United States.

Polyploidy: referring to an organism, tissue or cell with more than two complete sets of chromosomes.

Promiscuous: hybridizing freely.

Prothallium (syn. prothallus (*pl.* prothalli)): the small, green, heart-shaped structure (gametophyte) of a fern that produces both male and female sex cells. The prothallium forms from a spore. After fertilization, a young sporophyte plant develops.

Rachis: a continuation of the stipe that extends to the tip of the frond.

Reduction Division: the process by which a spore mother cell divides into four meiospores.

Rhizoid: root hair-like structures in liverworts, mosses and some vascular plants that occur on free-living gametophytes.

Rhizome: in ferns, a (usually) horizontal creeping stem from which the stipe and roots develop.

Simple: a fern frond that is not divided into pinnae.

Sorus (*pl.* sori): a cluster of sporangia.

Specific epithet: the second part of a scientific name. The genus name, followed by the specific epithet, designates the species.

Sporangium (*pl.* sporangia): a case in which spores are produced.

Sporophyte: the spore-producing phase in the fern life cycle.

Sporophyll: a modified leaf or leaf-like organ that bears sporangia.

Stipe: the stalk of a frond. The stipe supports the blade and continues as the rachis.

Subopposite: nearly opposite.

Talus: a sloping mass of debris accumulated at the base of a cliff.

Taxon (*pl.* taxa): a group of organisms sharing common characteristics in varying degrees, such as a family, genus or species.

Tripinnate: three times divided.

Zygote: a cell resulting from the fusion of male and female gametes.

Guide to Selecting Ferns

Fern Name	Shade	Partial Shade	Sun	Moist Soil	Wet Soil	Well-drained Soil	Humus-enriched	Alkaline Soil	Acid Soil	Among Rocks	Moderately Drought Tolerant	Easy to Grow	Difficult to Grow	Aggressive
Black-stemmed Spleenwort	•			•				•		•				
Broad Beech Fern	•	•		•		•								•
Bulblet Bladder Fern	•	•		•		•		•				•		
Christmas Fern	•	•		•		•				•		•		
Cinnamon Fern					•		•		•			•		
Climbing Fern, Hartford Fern		•	•	•					•				•	
Common Rockcap Fern, Rock Polypody	•	•								•				
Common Woodsia, Blunt-lobed Woodsia	•	•	•	•		•		•	•	•		•		
Crested Wood Fern				•	•		•		•					
Dixie Wood Fern	•			•	•		•							
Eastern Hay-scented Fern		•		•		•				•				•
Ebony Spleenwort		•				•		•	•	•		•		
Glade Fern	•			•				•		•	•			
Goldie's Wood Fern		•					•							
Hairy Lip-fern			•			•	•		•	•	•			
Interrupted Fern		•		•		•			•					
Log Fern	•	•	•	•	•			•				•		
Maidenhair Spleenwort	•			•						•			•	
Marginal Woodfern	•			•						•	•	•		

Guide to Selecting Ferns

Fern Name	Shade	Partial Shade	Sun	Moist Soil	Wet Soil	Well-drained Soil	Humus-enriched	Alkaline Soil	Acid Soil	Among Rocks	Moderately Drought Tolerant	Easy to Grow	Difficult to Grow	Aggressive
Marsh Fern	•			•								•		•
Mountain Spleenwort	•								•	•			•	
Netted Chainfern		•		•	•				•	•				
New York Fern	•	•		•	•							•		•
Northern Maidenhair Fern, Five-finger Fern		•				•	•	•	•					
Ovate Maiden Fern		•		•	•			•						
Purple Cliff-brake Fern		•				•	•	•		•				
Rattlesnake Fern		•		•			•						•	
Resurrection Fern	•	•								•	•		•	
Royal Fern		•			•				•			•	•	
Sensitive Fern		•			•									•
Silvery Spleenwort				•			•					•		
Southern Lady Fern		•		•							•	•		
Southern Maiden Fern		•		•	•	•		•	•		•	•		
Southern Maidenhair Fern, Venus Hair Fern		•		•	•			•			•			
Southern Wood Fern	•			•	•			•						
Virginia Chain Fern	•	•	•	•	•		•		•			•		
Wood Fern, Fancy Fern	•	•		•					•	•				
Woodland Fragile Fern				•			•					•		
Wooly Lip-fern			•			•	•	•		•	•			

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